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TZ-SERIES

SERVICE MANUAL

Disclaimer

This manual contains instructions for service operations on the ALE TZ-series print-heads and ink systems. Read it carefully before performing any manipulation on these.

All service operations should be undertaken by qualified personnel only. Contact-us if you need training for our equipment.

All information written in this Service Manual was correct at the time indicated in the version table below. However, the continual enhancement of our products may result in some differences existing between the information contained in this document and your equipment.

Version history:

Date:	Revision:	Modifications:	Author:
12/04/2007	First version	TZ72 only	JR/AF
17/09/2007	#2	All Tzs	AF
27/01/09	#3	Corrections: pages and chapters numbers	AF
10/09/09	#4	+ TZ 54	AF

Contents

Notes

1 The TZ system architecture

The TZ series systems are designed to be connected to one of the ALE controllers. Each TZ consists of an ink system connected to a print-head with an umbilical of 1m length.

Each TZ contains hydraulics and electronics:

- Hydraulics allow the ink flow from the reservoir (ink system) to the print-engine (print-head)
- Electronics are used to transmit the printing data from the J-series controller to the print-engine, to control the pump and in the communications between the TZ and the controller (ink low, spit...)

Both the ink system and the print-head are enclosed in stainless steel, at least 1,2mm thick.

1.1 Ink circuit

The TZ series printing systems introduce a single reservoir design with automatic level control and pump-assisted priming. The bottle is compatible with the entire range of ALE ink systems, containing a valve which is automatically sealed during bottle removal and fitting.

The reservoir is normally open to air via the *air vent* hole (Fig. 1). When the bottle or shipping cap is fitted the reservoir is completely sealed except at the print-engine nozzles and the air vent.

Fig. 1: Reservoir air vent

1.1.1 TZ18 ink circuit

Below is a schematic describing the TZ18 ink circuit. It includes a reservoir, a direct prime module, a pump, an ink tube and a shut-off valve for the print-head with a syringe connection. The shut-off valve allows to close the ink circuit between the ink reservoir and the print engines. Because the syringe connection is located between the valve and the print engines, it is possible to use a syringe to flush the print engines only (the valve is closed for that operation, see 2.8 Flushing a TZ18/34 print-head with a syringe

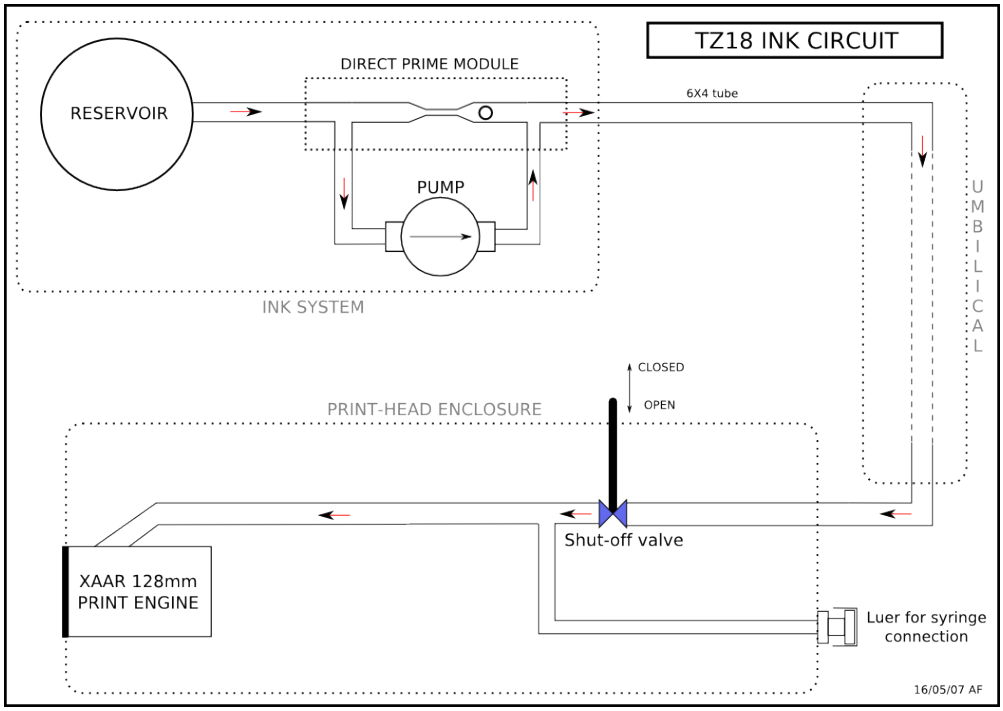

Fig. 2: TZ18 ink circuit

Priming mode : the pump sucks ink from the reservoir and sends it towards the print-engine through the umbilical. If the shut-off valve is closed, nothing happens.

If the shut-off valve is open, the ink will go through the print engine.

When the pump is active, the ball in the direct prime module blocks the way and the ink cannot go back to the reservoir. When the pump is inactive the balls goes out of the way and the ink can pass through the direct prime module (see Fig. 6).

Printing mode : the print engine takes ink from the reservoir through the direct prime module, through the 6X4 tube, the valves and the filter. The ink is ejected by the print engine nozzles.

1.1.2 TZ34 ink circuit

Below is a schematic describing the TZ34 ink circuit (Fig. 3). It includes a reservoir, a direct prime module, a pump, two ink tubes and a shut-off valve for the print-head with a syringe connection. The shut-off valve allows to close the ink circuit between the ink reservoir and the print engines. Because the syringe connection is located between the valve and the print engines, it is possible to use a syringe to flush the print engines only (the valve is closed for that operation, see 2.8 Flushing a TZ18/34 print-head with a syringe).

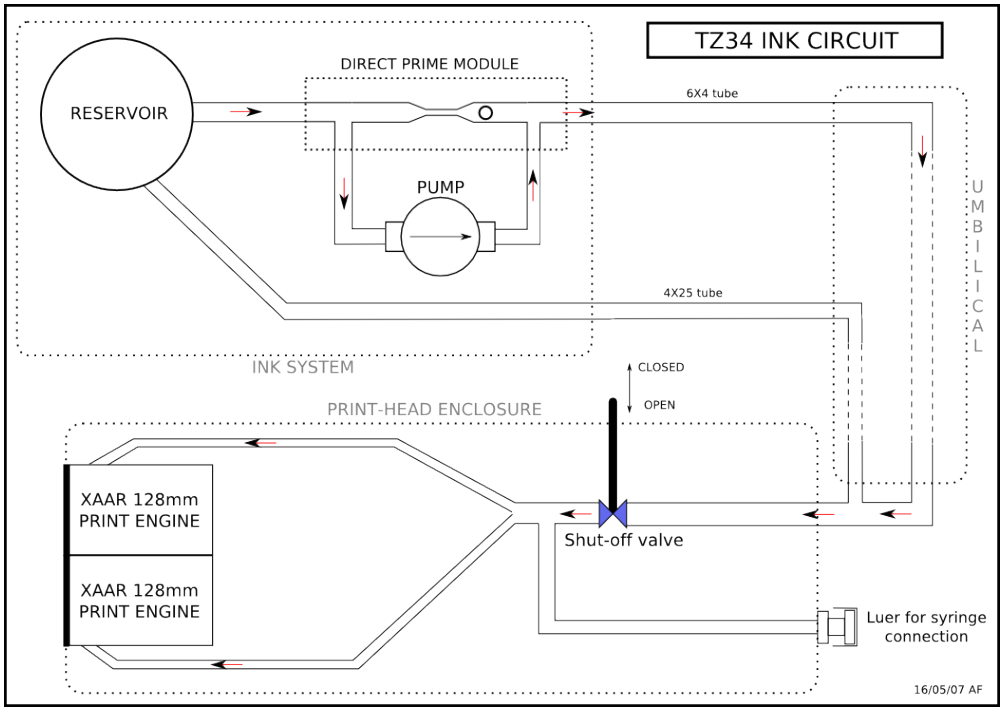

Fig. 3: TZ34 ink circuit

Priming mode : the pump sucks ink from the reservoir and sends it towards the print-engine through the umbilical. If the shut-off valve is closed, all the ink flows back to the reservoir through the 4x25 tube. This is particularly useful to get rid of air in the umbilical (e.g. when the system is dry), without losing ink: the pump will force the air back into the reservoir where it can escape through the air cap hole. When there is no air left in the umbilical, only ink is sent back to the reservoir.

If the shut-off valve is open, most of the ink will go through the print engines. A small part of the ink will still go back to the reservoir through the 4x25 tube.

When the pump is active, the ball in the direct prime module blocks the way and the ink cannot go back to the reservoir. When the pump is inactive the balls goes out of the way and the ink can pass through the direct prime module (see Fig. 6).

Printing mode : the print engines take ink from the reservoir through the direct prime module, through the 6X4 tube, the valves and the filter. The ink is ejected by the print engines nozzles.

1.1.3 TZ54 ink circuit

Below is a schematic describing the TZ54 ink circuit. It includes a reservoir, a direct prime module, a pump, two ink tubes, a CPC connector (more details below), a shut-off valve for the print-head and a filter. The CPC shut-off valve is a special disconnectable valve at the back of the print-head enclosure. When disconnected, both ends will shut off automatically. This allows to separate the print-head from the umbilical (e.g. for servicing). See chapter 2.7.2.Separate TZ54 print-head from ink system for instructions on this operation.

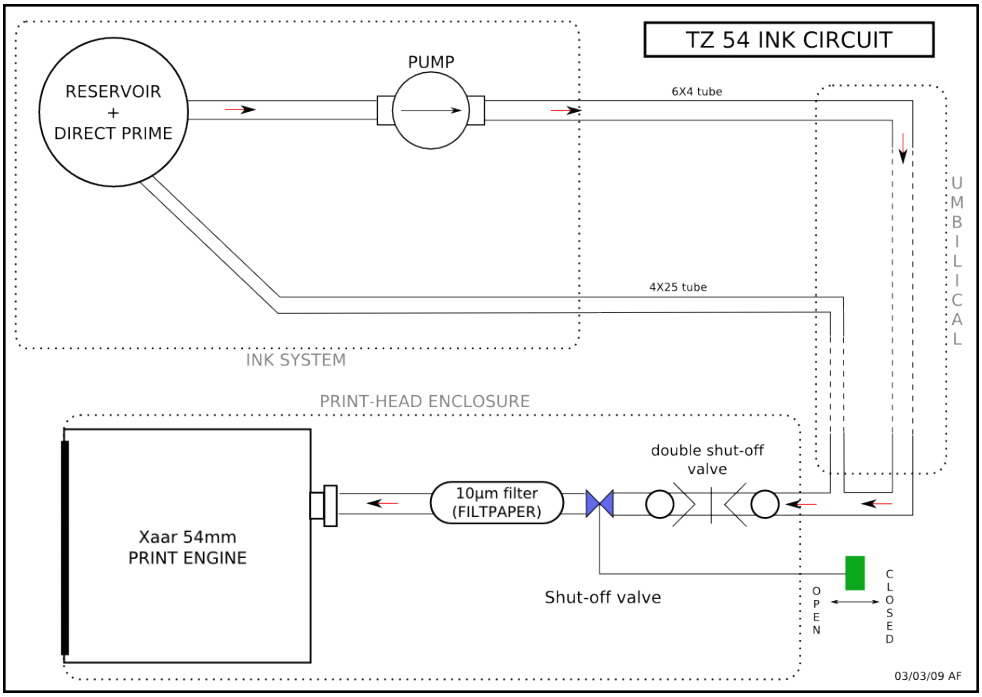

Fig. 4: TZ 54 ink circuit

1.1.4 TZ72 ink circuit

Below is a schematic describing the TZ72 ink circuit. It includes a reservoir, a direct prime module, a pump, two ink tubes, a CPC connector (more details below), a shut-off valve for the print-head and a filter. The CPC shut-off valve is a special disconnectable valve at the back of the print-head enclosure. When disconnected, both ends will shut off automatically. This allows to separate the print-head from the umbilical (e.g. for servicing). See chapter 2.7.3.Separate TZ72 print-head from ink system for instructions on this operation.

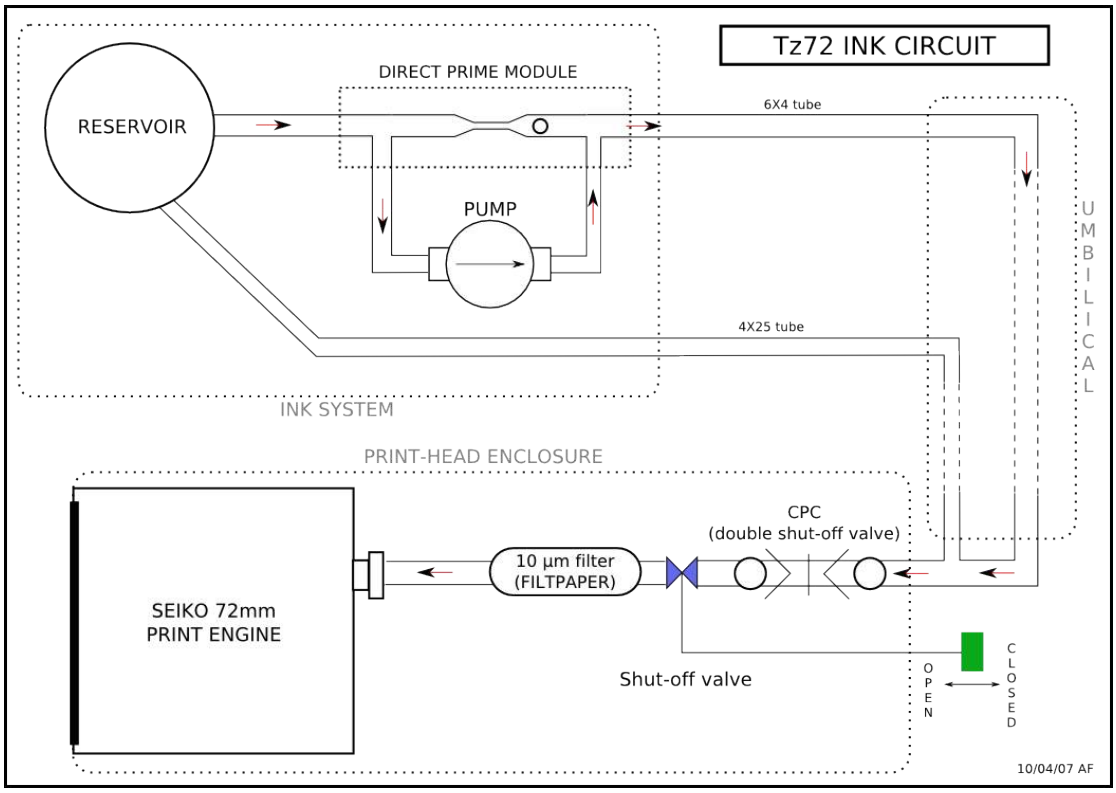

Fig. 5: TZ72 Ink circuit

The ink circuit works in two modes : priming and printing.

Priming mode : the pump sucks ink from the reservoir and sends it towards the print-engine through the umbilical. If the shut-off valve is closed or the CPC is disconnected, all the ink flows back to the reservoir through the 4x25 tube. This is particularly useful to get rid of air in the umbilical (e.g. when the system is dry), without losing ink: the pump will force the air back into the reservoir where it can escape through the air cap hole. When there is no air left in the umbilical, only ink is sent back to the reservoir.

If the shut-off valve is open, most of the ink will go through the filter and then the print engine. A small part of the ink will still go back to the reservoir through the 4x25 tube.

When the pump is active, the ball in the direct prime module blocks the way and the ink cannot go back to the reservoir. When the pump is inactive the balls goes out of the way and the ink can pass through the direct prime module (see Fig. 6).

Printing mode : the print engine takes ink from the reservoir through the direct prime module, through the 6X4 tube, the valves and the filter. The ink is ejected by the print engine nozzles.

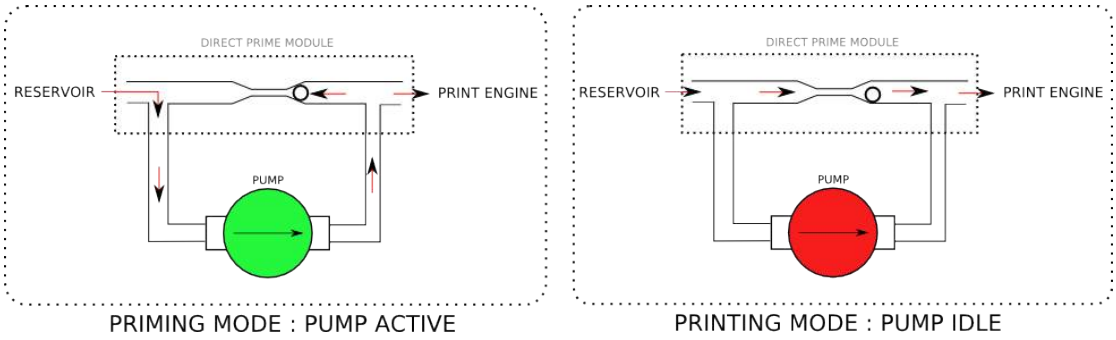

Fig. 6: Direct prime

1.2 Pump function

The pump only function is to prime the ink circuit. It is not used to refill the reservoir, this is done automatically by gravity.

The pump can operate at two pressure rates:

- "Norm" : normal power priming, used to remove small air bubbles from the circuit or to clean the nozzles plate. The pump is only activated for a few seconds at a time
- "Jet" : high power priming, used to fill an empty ink circuit

The pump is connected to the driver board and is activated by the controller using a "Pulse Width Modulated (PWM)" signal.

1.3 Electronic components: driver boards

The function of the driver board is the transmission of the data sent by the controller to the relevant equipment. It is involved in all operations of the printing system.

The TZ18 and TZ34 driver boards are quite similar as they are printing with 18mm print-engines (1 for the TZ18, 2 for the TZ34).

The TZ54 has a visually close but technologically very different driver board from TZ18 and 34 (54mm print band instead of 1x or 2x 18mm), different protocol)

The TZ72 is driven by a special driver board, as the Seiko print-engine has a different print-height and a different protocol from 18-34 and 54mm Xaar print-engines.

Note: TZ18, 34 and 54 driver board is located in the ink system, whereas 72mm driver board is located in the print-head enclosure.

1.3.1 TZ18 and TZ34 driver board

The driver board for TZ18 and TZ34 systems is the same. It is called ETXDB02 and is located in the ink system, next to the pump. This driver board is also used in ET systems in the same way.

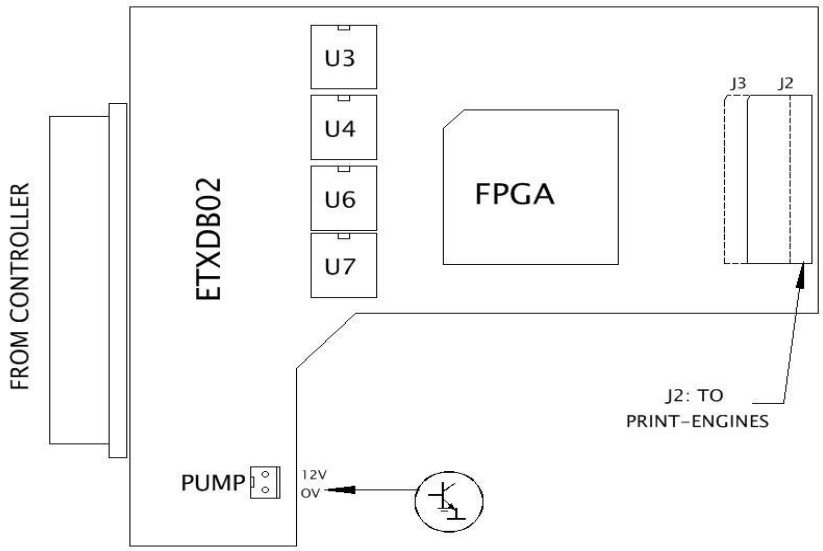

Fig. 7: ETXDB02 driver board

With TZ18, only J2 is connected to the only one print-engine contained in the print-head.

In TZ34, J2 is connected to the top print-engine and J3 is connected to the bottom one.

In case you need to change the driver board or the FPGA chip that is fitted on it, the ALE references are the following:

- ETXDB02 driver board for TZ18 or TZ34 system: PCB-TZX
- FPGA chip for TZ18 or TZ34: ACTTZX

1.3.2 TZ54 driver board

The driver board for TZ54 has approximately the same shape as the TZ18/34 driver board, but uses a different technology. It is called TzDB and it is located in the ink system, next to the pump.

It features an IEEE1394 (aka FireWire) connector to plug the print-head (whereas ETXDB02 uses 1 or 2 14 pin connectors).

Another change compared to ETXDB02 is that the ink low detection circuit is integrated on the driver board. The potentiometer to adjust the ink low detection, which is located on the TzDB driver board, is accessible from outside, without having to open the ink system (see TZ 54 user manual).

The FPGA of the TzDB is soldered and does not need to be replaced.

In case of replacement, the reference of the TZ54 driver board is PCB-TZDB.

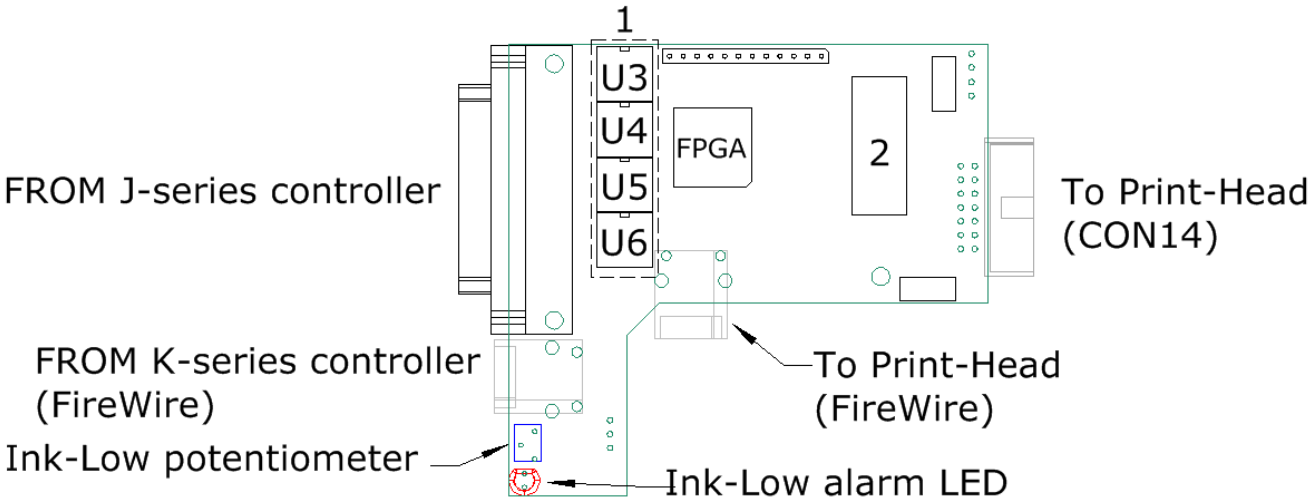

Fig. 8: TZDB driver board

1.3.3 TZ72 driver board

The driver board for TZ72 is called ET7DB02 and is not located in the ink system but in the print-head, close to the print-engine.

This driver board is also used in all ET7 print-heads, in a different configuration. This is the reason why only one of the two pump connectors is used.

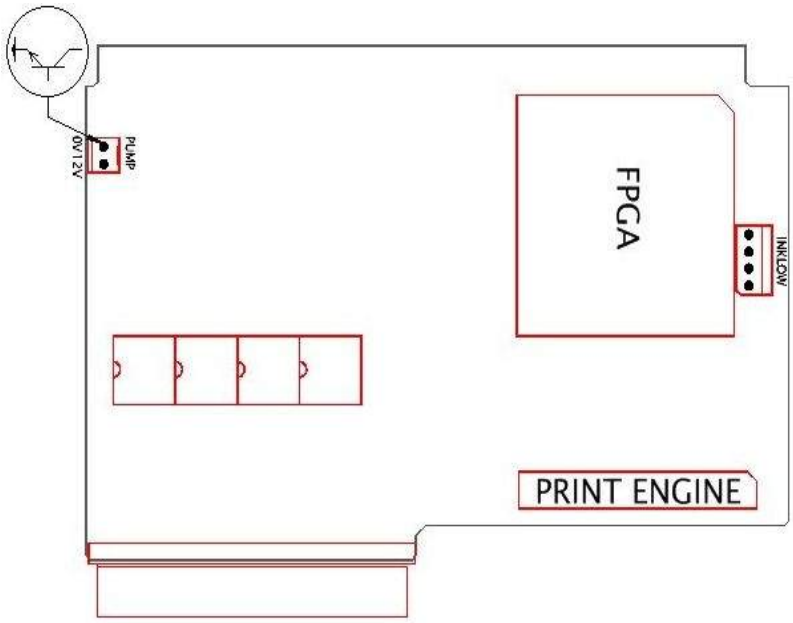

Fig. 9: ET7DB02 driver board

If you need to replace the FPGA chip, the reference is: ACTET780PL (solvent version) or ACTET735PL (oil version).Note: TraceX® levels may be added to the FPGA chips references to enable optional features like EntriX, VerifiX...They are called TAC1, TAC2...

1.4 Hydraulic architecture

1.4.1 TZ18 hydraulic architecture

Below are graphics describing the ink circuit in the ink system (Fig. 11) and the print-head (Fig. 12). The shut-off valve is made of a flexible tube clamped by a

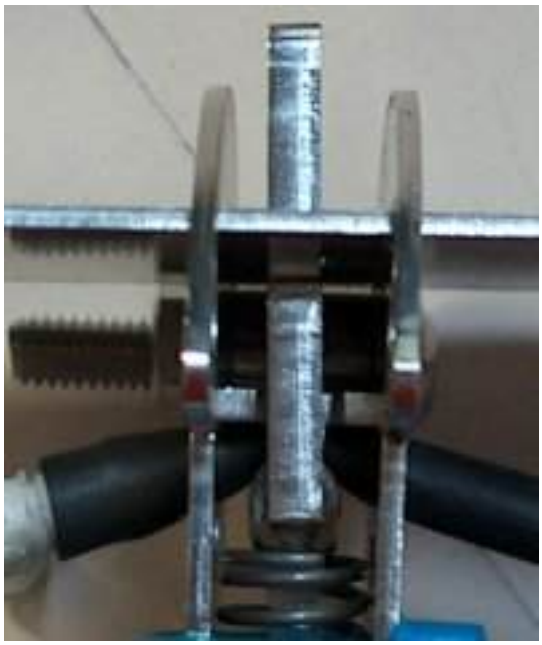

Fig. 10: Oil version clamp valve

switch and a spring (Fig. 10).
Note that depending on the version (Oil or Solvent), the valve tube is not the same. Always replace tubes and fittings with those supplied by ALE.

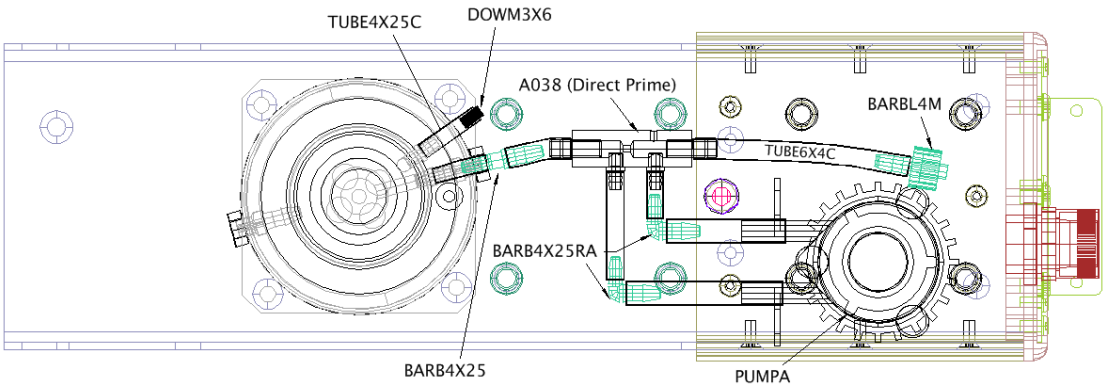

Fig. 11: TZ18 ink system tubes and fittings

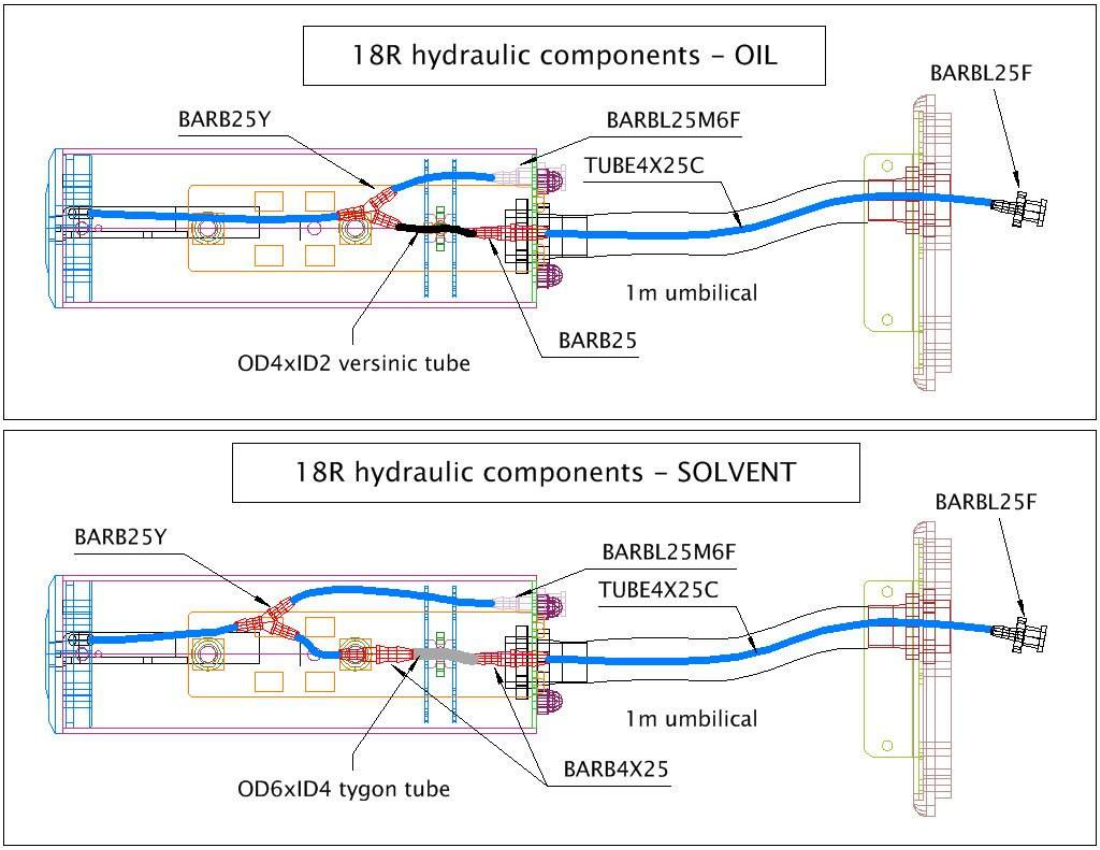

Fig. 12: 18R print-head tubes and fittings

1.4.2 TZ34 hydraulic architecture

Below are graphics describing the ink circuit in the ink system (Fig. 14) and the print-head (Fig. 13). Note that depending on the version (Oil or Solvent), the valve tube is not the same Always replace tubes and fittings with those supplied by ALE.

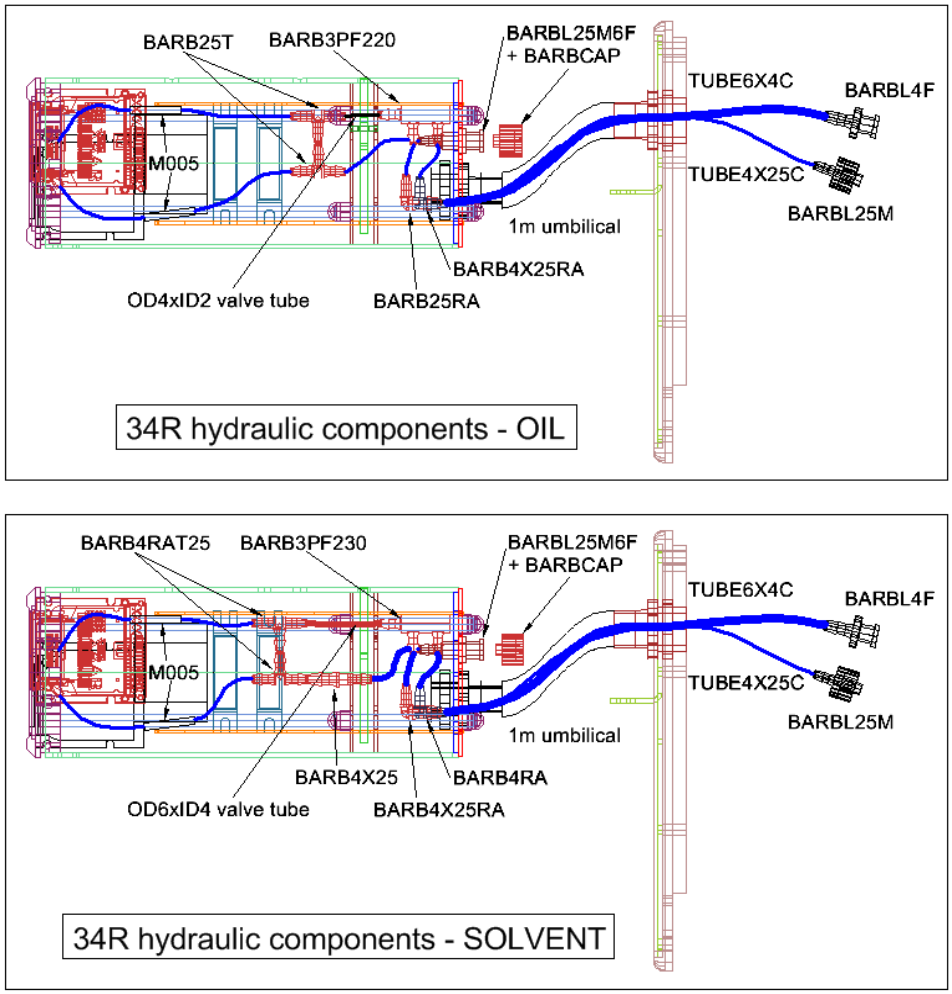

Fig. 13: 34R (TZ 34) print-head tubes and fittings

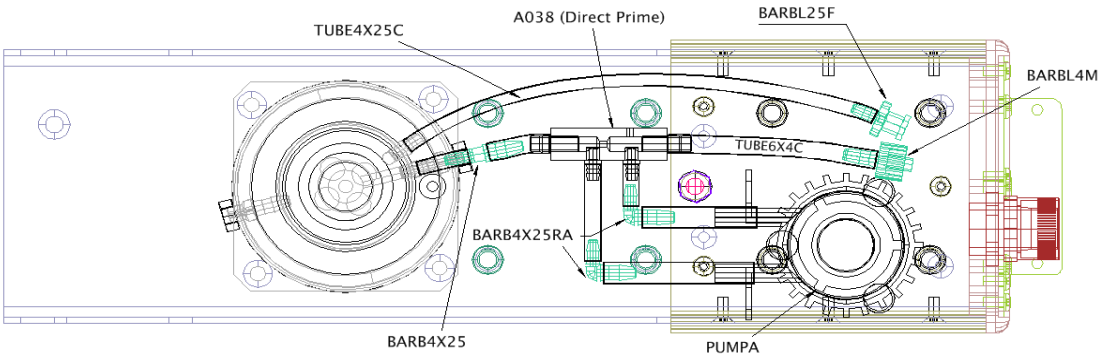

Fig. 14: TZ34 , TZ54 and TZ72 Ink system tubes and fittings

1.4.3 TZ54 hydraulic architecture

Below are graphics describing the ink circuit in the ink system (Fig. 14), the umbilical (Fig. 16) and the print-head (Fig. 15). Always replace tubes and fittings with those supplied by ALE.

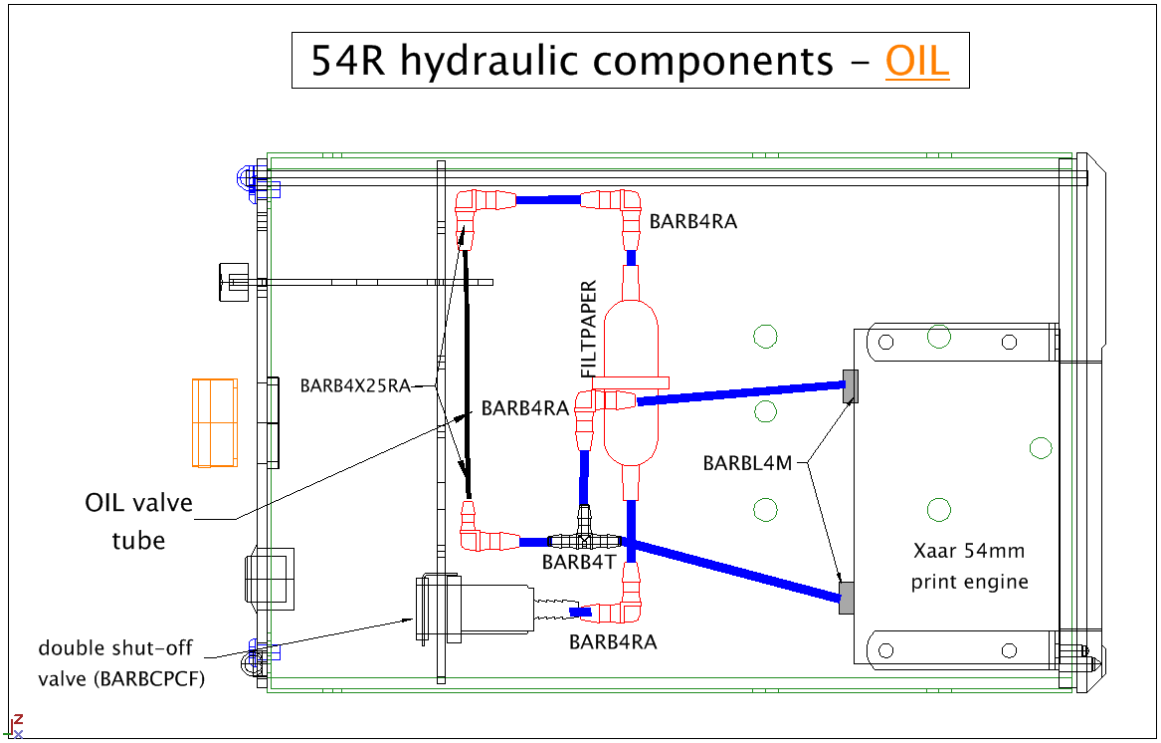

Fig. 15: 54R (TZ 54) Print-head barbs and fittings

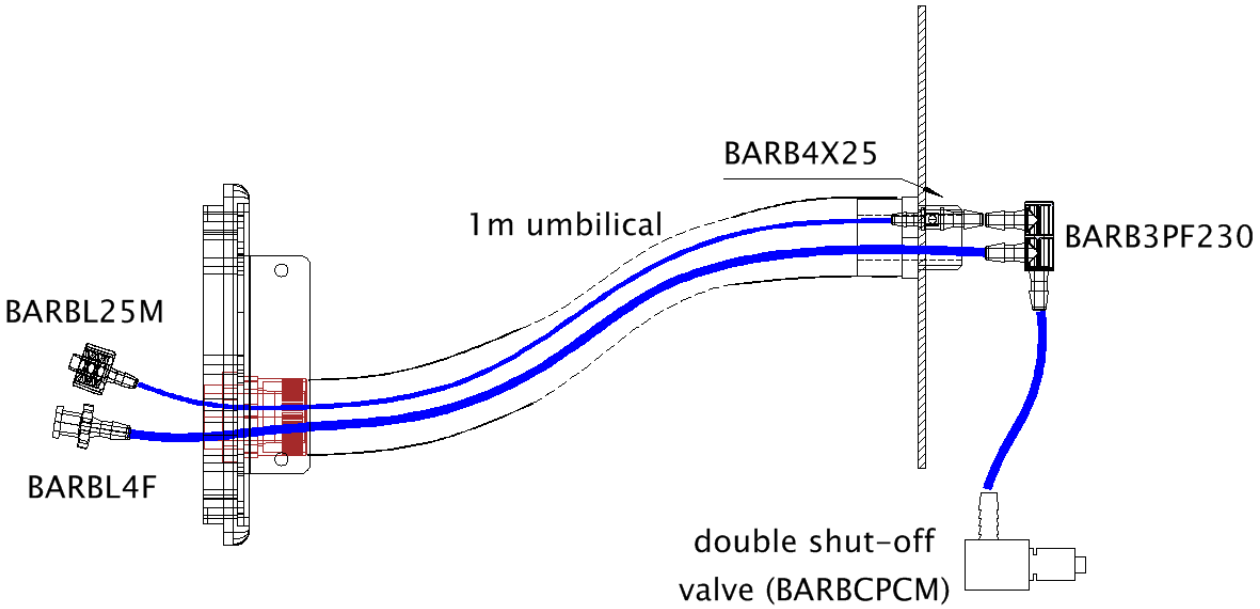

Fig. 16: TZ54 and TZ72 Umbilical tubes and fittings

1.4.4 TZ72 hydraulic architecture

Below are graphics describing the ink circuit in the ink system (Fig. 14), the umbilical (Fig. 16) and the print-head (Fig. 17). Always replace tubes and fittings with those supplied by ALE.

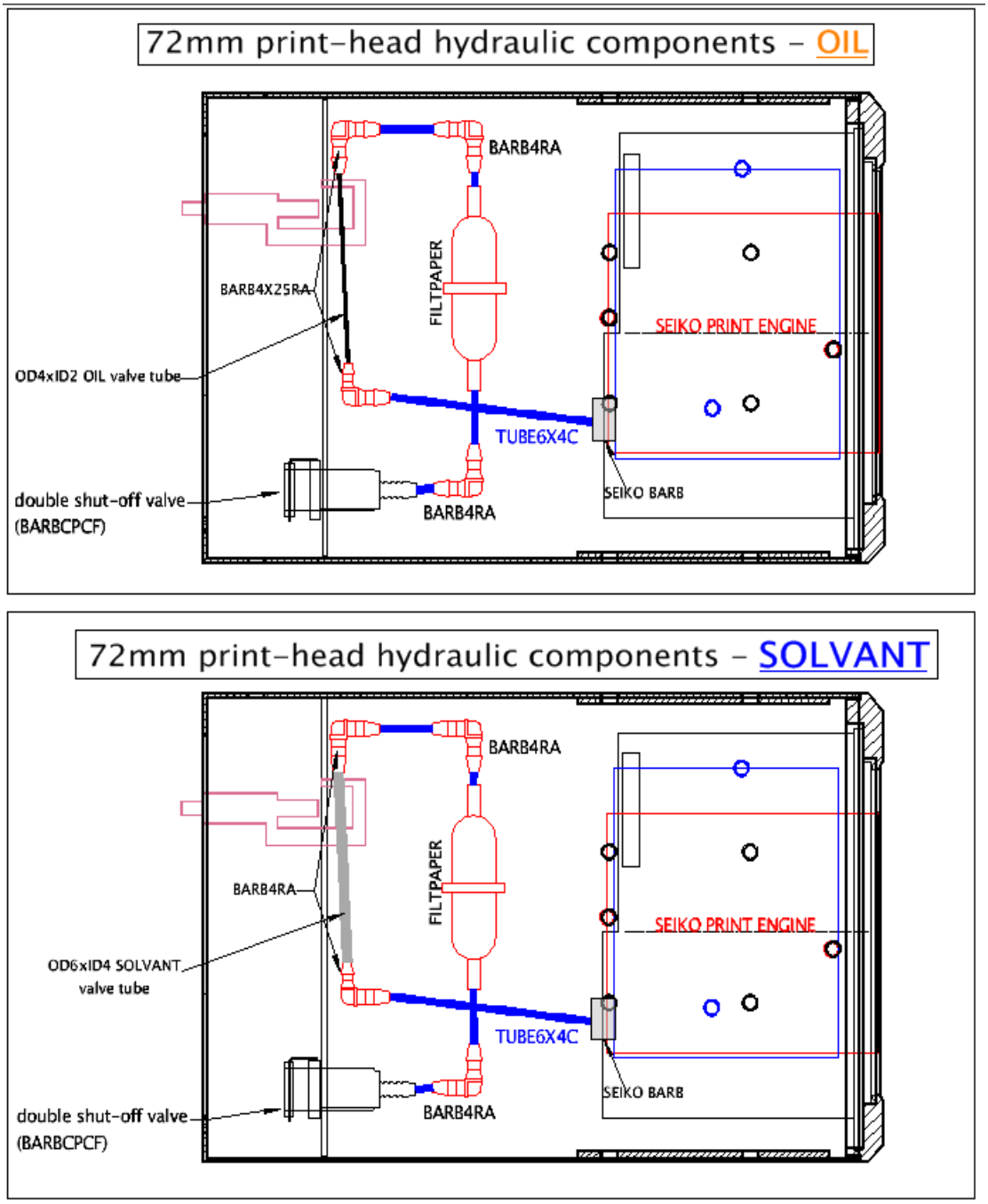

Fig. 17: TZ72 print-head tubes and fittings

1.5 Colour codes and ink compatibility

WARNING: Never change the ink type in a printer and use only ALE supplied fluids! Mixing different inks causes catastrophic damage. Components of the hydraulic circuit can be damaged by inappropriate ink or solvent.

The ink reservoirs and pumps are coded with colour tie-wraps. The pumps are coded with a tie-wrap around the gear-head.

Ink reservoir and pump colour codes:

- RED means: compatible with ALE supplied solvent-based inks
- YELLOW means: compatible with ALE supplied oil-based inks
- NONE means: compatible with ALE supplied oil-based inks

Other ink types: please contact ALE for further compatibility information.

2 Service procedures

2.1 Replacing the FPGA chip on a driver board

2.1.1 Replacement of TZ18 or TZ34 FPGA chip

To replace the driver board in a TZ18/34, follow these steps:

- Switch the controller OFF and disconnect the data cable
- Open the ink system as shown in 2.4 Open the ink system
- Remove the FPGA chip from the driver board. Note: you will need to use a PLCC extractor tool to remove it safely (see Fig. 18)

Fig. 18: PLCC extractor

- Insert the replacement chip with care
- Close the ink system

2.1.2 Replacement of TZ72 FPGA chip

Proceed as follows:

- Refer to chapter 2.6.2 Separate TZ72 print-head from ink system to separate the print-head from the umbilical.
- Then open the print-head as per chapter 2.7.3 Open the TZ72 print-head
- Remove the FPGA chip with a PLCC extractor (Fig. 18)
- Insert the replacement chip with care
- Close print-head
- Re-attach the umbilical

2.2 Replacing the driver board

2.2.1 Replacement of TZ18 or TZ34 driver board

To replace the driver board in a TZ18/34, follow these steps:

- Switch the controller OFF
- Open the ink system as described in 2.4 Open the ink system

- Disconnect all connections to the driver board:
  - ➔ Controller input (25 way ribbon cable with D connector)
  - ➔ Note the order in which the ribbon cables are fitted for later refitting
  - ➔ Print-engine(s) output(s) (14 way ribbon cable(s))
  - ➔ Pump (2 way plug with black & red wires)
- The driver board is attached to the back plate with a square bracket:
  - ➔ Undo the nut and screw
  - ➔ Put the replacement driver board in place
- Re-assemble the system by following the previous steps in reverse order

2.2.2 Replacement of TZ54 driver board

To replace the driver board in a TZ54, follow these steps:

- Switch the controller OFF
- Open the ink system as described in 2.4 Open the ink system
- Disconnect all connections to the driver board (Note the order in which the ribbon cables are fitted for later refitting)
  - ➔ Print-engine output (FireWire cable)
  - ➔ Pump (2 way plug with black & red wires)
  - ➔ Ink low detection (3 way plug with black, blue and white wires)
- The driver board is attached to the back plate with 2 pillars:
  - ➔ Unscrew the pillars
  - ➔ Put the replacement driver board in place
- Re-assemble the system by following the previous steps in reverse order

2.2.3 Replacement of TZ72 driver board

As it contains many fragile parts, replacing the TZ72 driver board is a factory operation. If the driver board replacement is needed, it is recommended to send us the TZ72 print-head (See chapter 2.6.2 Separate TZ72 print-head from ink system for instructions on separating the print-head from the rest of the printer).

2.3 Access to the ink reservoir

Access to the contents of the ink reservoir is needed for replacing the filter at the bottom of the reservoir.

- Unscrew the ink tray (2 M5 button head screws on the pump plate and 4 M4 button-head screws through the ink tray). Remove the ink tray. Be careful that a small o-ring from the reservoir lid doesn't stick to it.

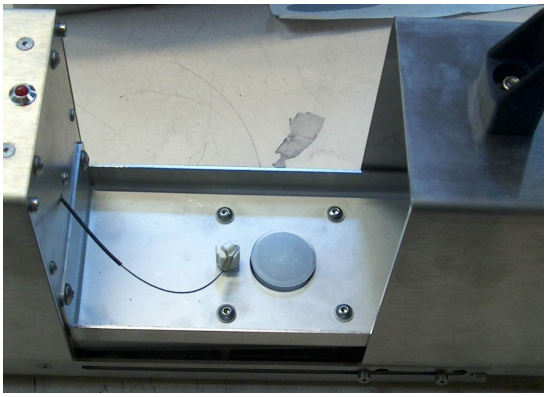

Fig. 19: remove M4 and M5 screws from the ink tray

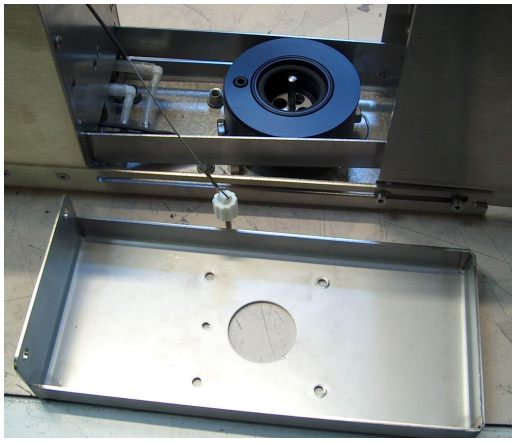

Fig. 20: remove the ink tray

- Remove the side panels assembly from the pump plate by moving it up then back.

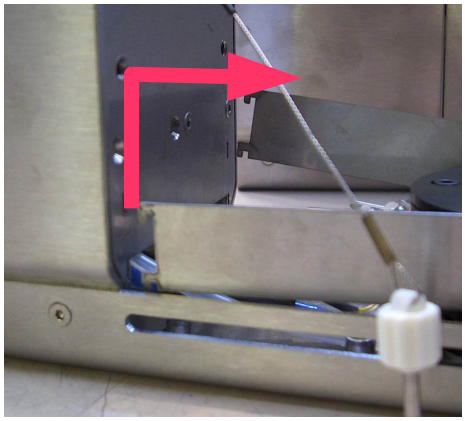

Fig. 21: Remove the side panels assembly from the pump plate

- Remove the lid of the reservoir. You now have access to the contents of the reservoir.

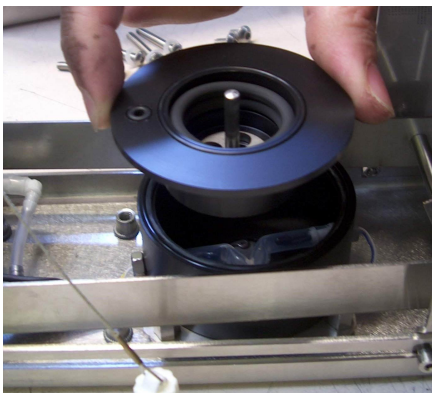

Fig. 22: remove the lid of the reservoir

2.4 Open the ink system

- Unscrew the 3x M4 button-head screws shown in Fig. 23 and move the back plate backwards

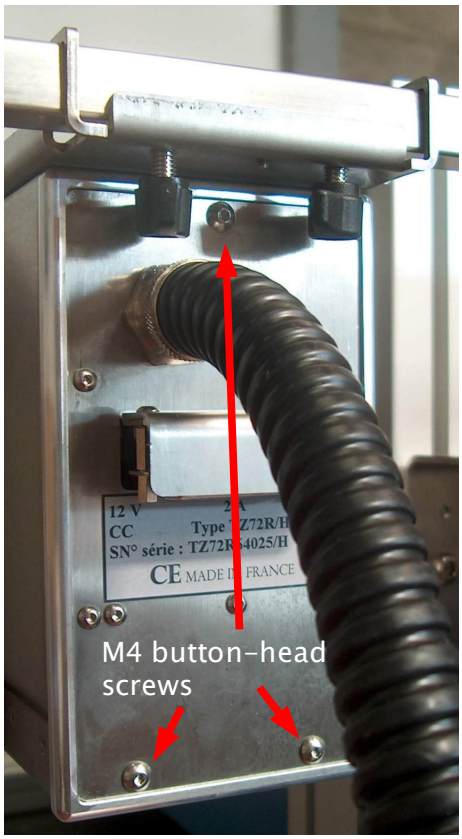

Fig. 23: Open ink system

2.5 Changing a print engine

2.5.1 Changing the TZ18 print engine

To change the TZ18 print engine follow these steps:

- open the print-head by following the instructions given in 2.9.1.Open the TZ18 print-head

- Disconnect the ink tube between the print engine and the valve (Fig. 24)

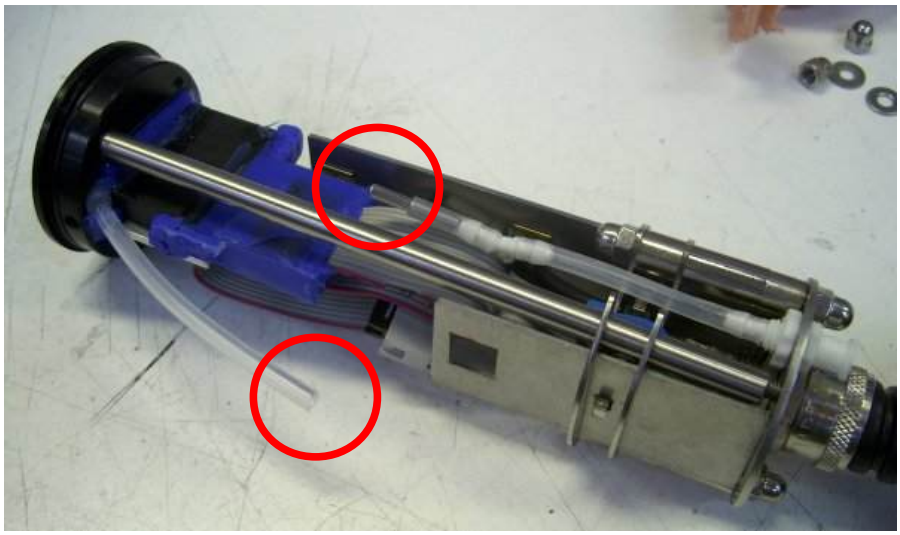

Fig. 24: disconnect the ink tube

– Disconnect the print engine connector and extract the print engine assembly (Fig. 25)

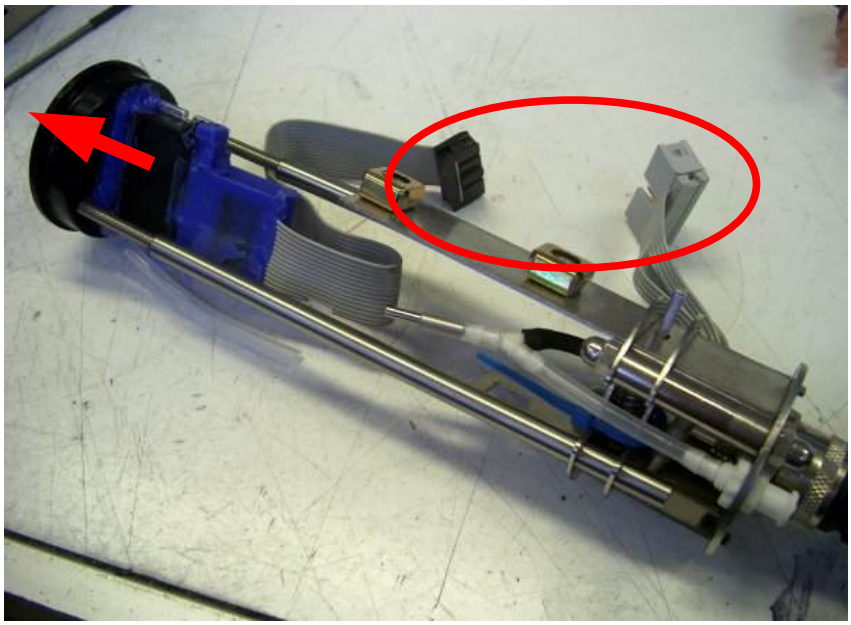

Fig. 25: disconnect and extract the print engine

– replace the print engine assembly and reassemble the print-head by following the steps in reverse order

2.5.2 Changing a TZ34 print engine

To change the TZ34 print engine follow these steps:

- open the print-head by following the instructions given in 2.9.2.Open the TZ34 print-head

- Disconnect the print engine electronic connectors (Fig. 26).

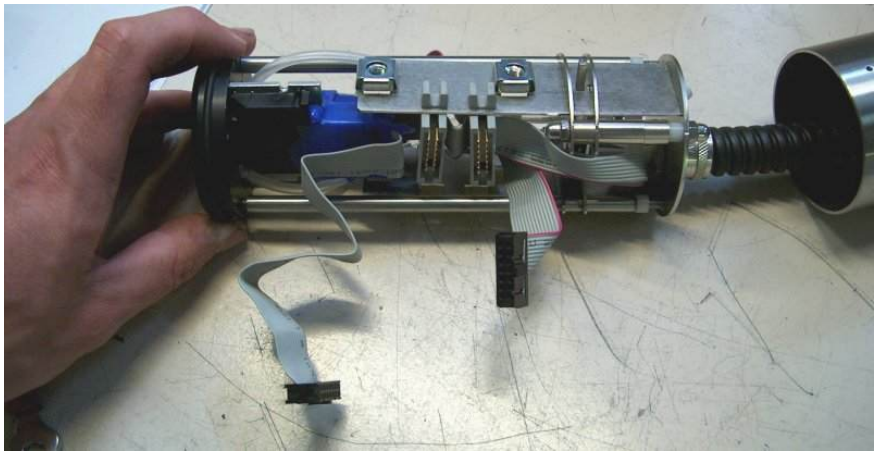

Fig. 26: unplug the electronic connectors

- Disconnect the ink tubes from the print engines (Fig. 27) and extract the print engines assembly (Fig. 28).

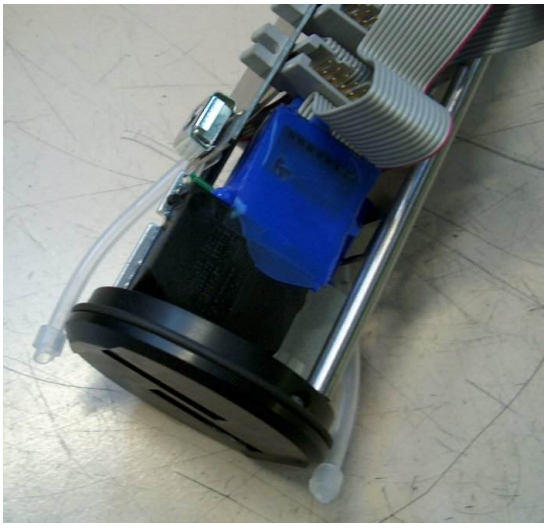

Fig. 27: disconnect ink tubes

Fig. 28: extract the print engine assembly

- Remove the ink tubes left (Fig. 29).

Fig. 29: remove the old ink tubes

– Unscrew the flat-head screw holding the defective print engine (Fig. 30) and remove the print engine (Fig. 31).

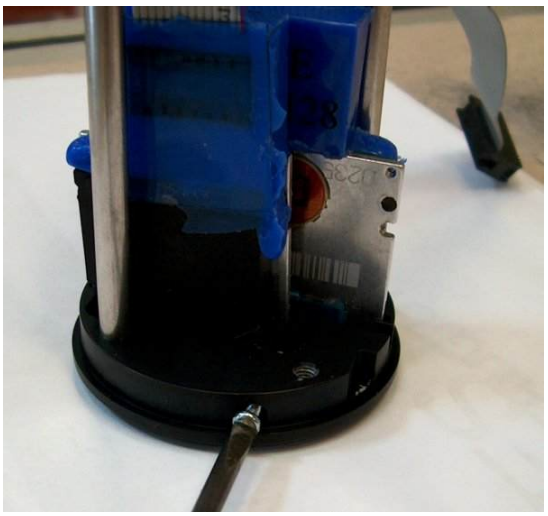

Fig. 30: unscrew M2,5 flat-head screw

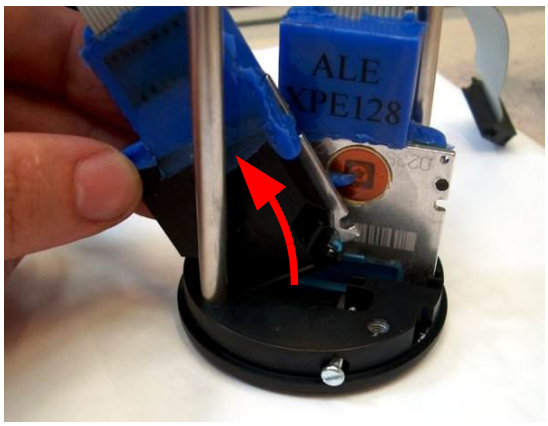

Fig. 31: remove deficient print engine

– Fit the replacement tube on the remaining print engine -given with the replacement print engine (Fig. 32).

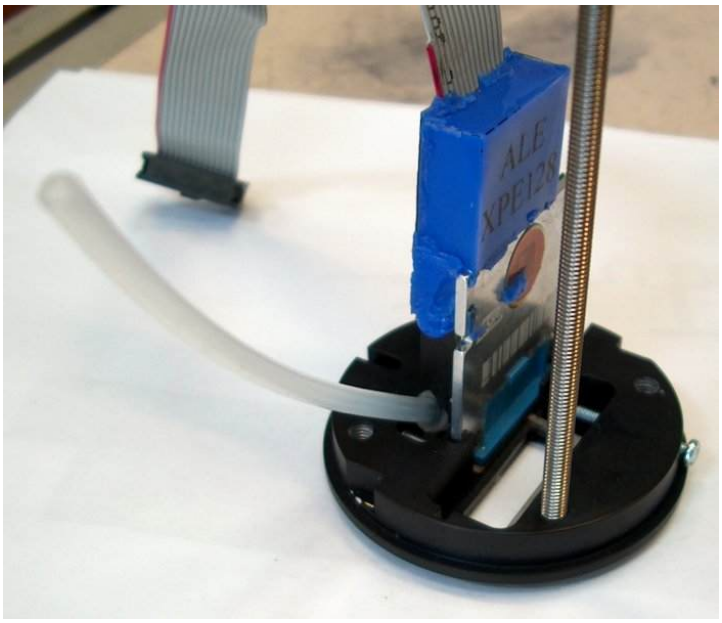

Fig. 32: fit replacement tube

– Put the new print engine in place (Fig. 33).

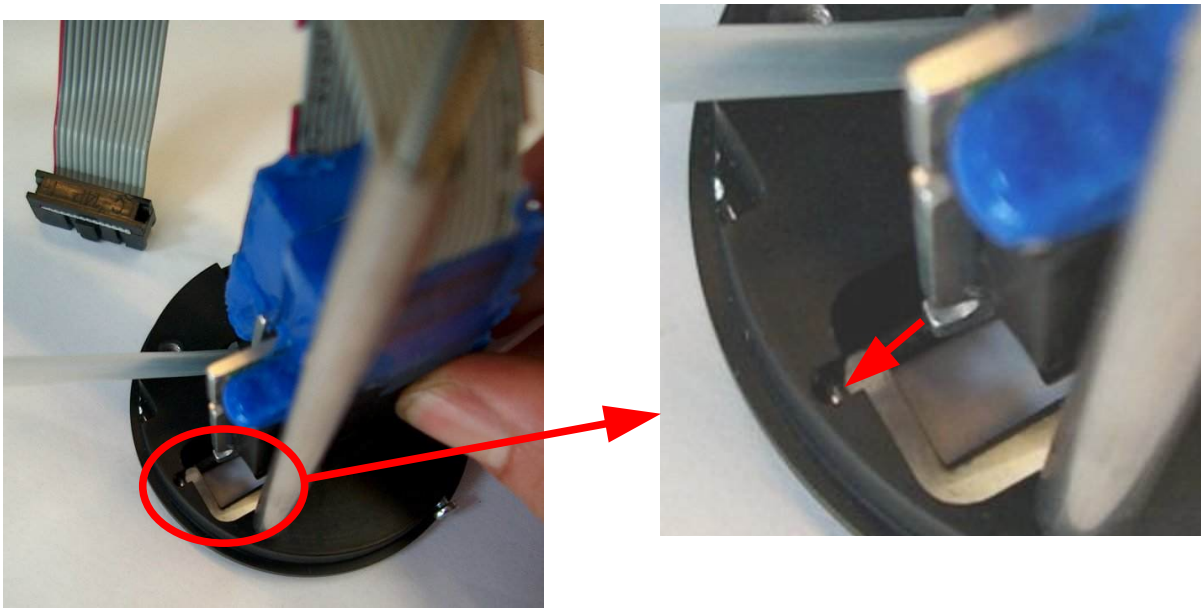

Fig. 33: put the new print engine

– Re-screw the M2,5 flat-head screw

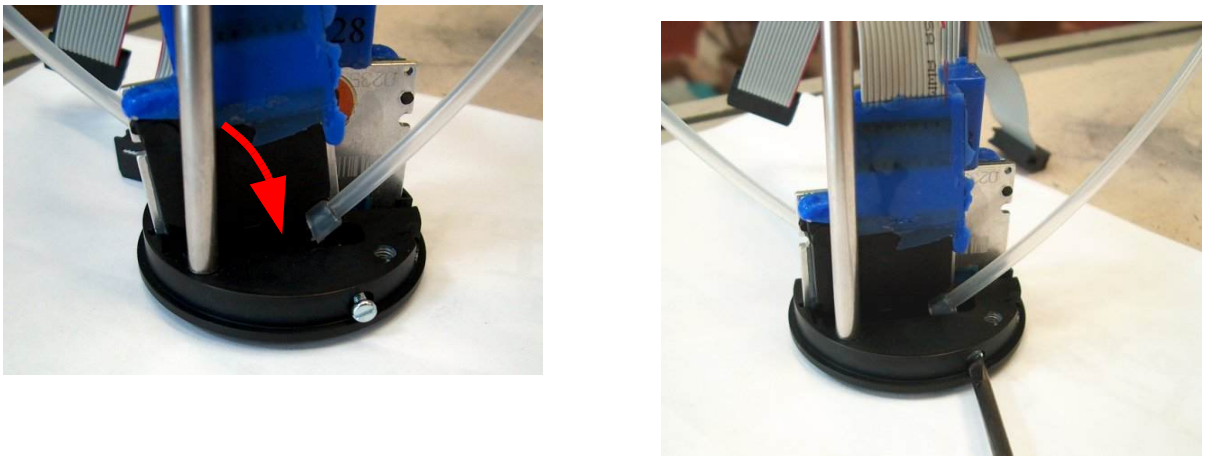

Fig. 34: re-screw the M2,5 screw

- Connect the ink tubes coming from the print engines to the ink circuit.

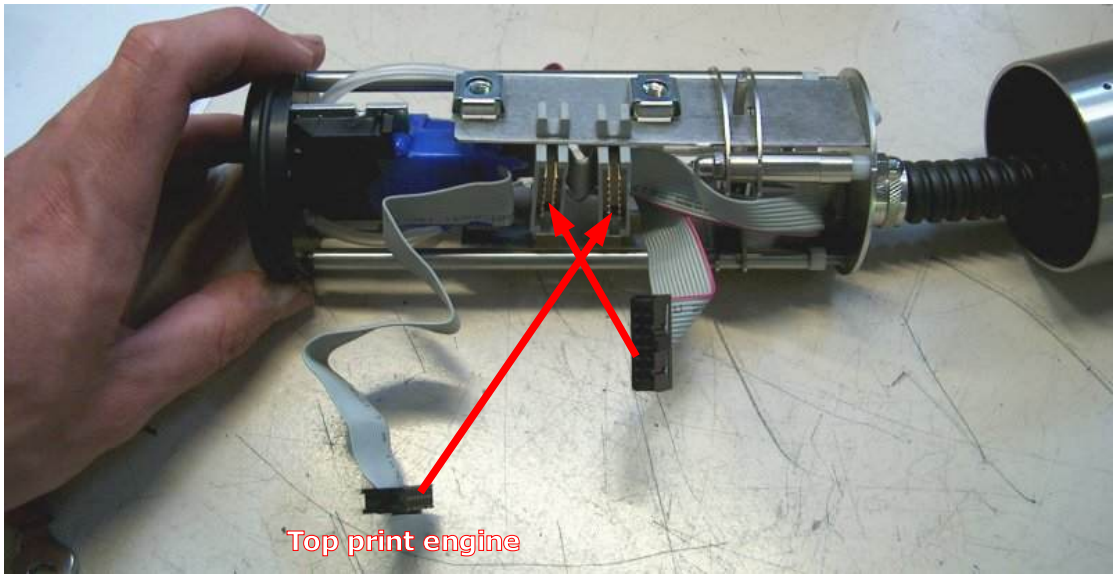

Fig. 35: re-plug the electronic connectors

- Re-connect the print engines electronic connectors (Fig. 35).

- reassemble the rest of the print-head by following the steps given in 2.9.2.Open the TZ34 print-head in reverse order.

2.5.3 Changing the TZ54 print-engine

Due to the fragility of the 54mm Xaar print engine and the complexity of the print-head, the print-head should be sent back to ALE for this operation. See chapter 2.7.2.Separate TZ54 print-head from ink system for instructions on separating the print-head from the rest of the printer.

2.5.4 Changing the TZ72 print-engine

Due to the fragility of the 72mm Seiko print engine and the complexity of the print-head, the print-head should be sent back to ALE for this operation. See chapter 2.7.3.Separate TZ72 print-head from ink system for instructions on separating the print-head from the rest of the printer.

2.6 Adjusting the ink low detection

In Tz18, 34 and 72, the ink low detection PCB is mounted onto the pump plate, on the same side as the pump.In Tz54, the ink low detection circuit is integrated on the driverboard PCB, and adjustable from outside. Ink low detection has been specifically adjusted in ALE factory and should not be changed : there is a risk of running the printer dry or to have a too frequent ink low signal on the controller.

2.6.1 Tz 18, 34 and 72 ink low detection adjustment

Proceed as follows if you still wish to adjust ink low detection:

- Switch the controller OFF
- Open the ink system as in 2.4 Open the ink system
- Use a long and thin "cross-head" screwdriver to reach the potentiometer on the ink low PCB (Fig. 36)
- Switch the controller ON

- Adjust the potentiometer as necessary. Don't forget that ink low detections have a latency: ink takes a bit of time to drip from the detection tubes.

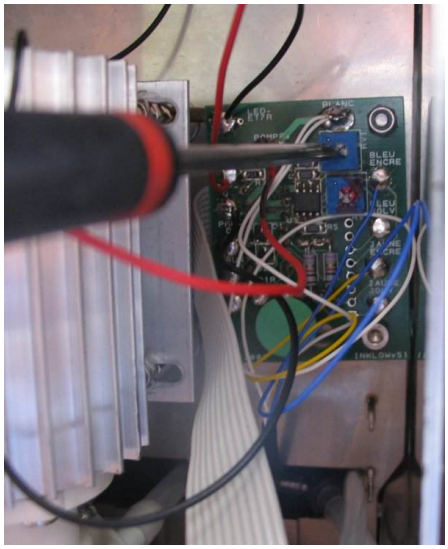

Fig. 36: Ink low adjusting

2.6.2 Tz 54 Ink low adjustment

On Tz54, the ink low detection potentiometer is accessible from outside(Fig. 37).

Fig. 37: Tz 54 Ink low adjustment

Fig. 38: Tz 54 ink low adjustment

- Use a long and thin "cross-head" screwdriver to reach the potentiometer on the ink low PCB (Fig. 38)
- Switch the controller ON
- Adjust the potentiometer as necessary. Don't forget that ink low detections have a latency: ink takes a bit of time to drip from the detection tubes.

2.7 Separating the print-head from the ink system

2.7.1 Separate TZ18 or TZ34 print-head from ink system

- Empty the ink circuit : remove the ink bottle, use the "jet" function of the purge menu of the controller to empty the ink circuitOpen the ink system as in 2.4 Open the ink system
- Disconnect the ink tube(s) between the back plate and the ink system
- If possible close the tubes with caps to protect the ink circuit from the dust

2.7.2 Separate TZ54 print-head from ink system

Follow these steps:

- Switch controller power OFF and remove the data cable
- Undo the 4xM4 button-head screws at the back of the print-head (Fig. 39)
- Pull the back plate (Fig. 40)

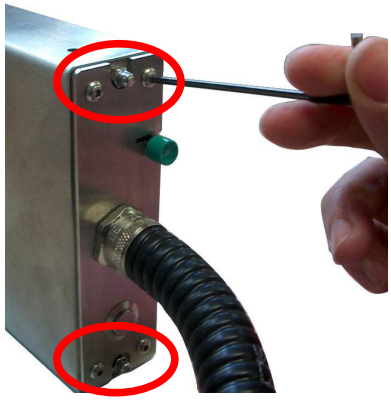

Fig. 39: Unscrew the 4 M4 screws

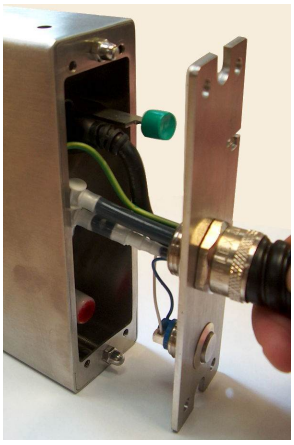

Fig. 40: Pull the back plate

- Disconnect the double shut-off valve (Fig. 41)
- Disconnect the FireWire cable coming from the umbilical into the print-head (Fig. 42)
- Disconnect the earth connector (Fig. 43)

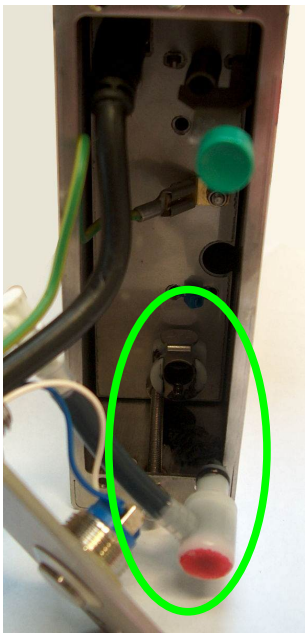

Fig. 41: double shut-off valve

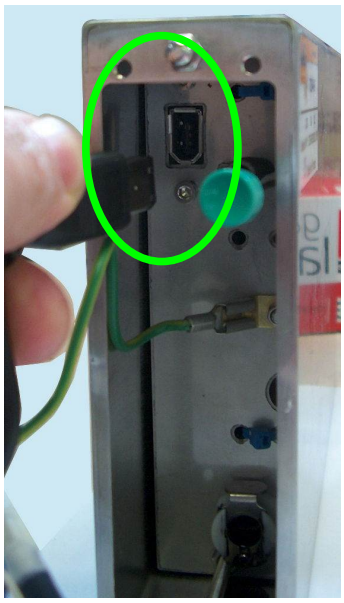

Fig. 42: FireWire cable

Fig. 43: Earth connector

2.7.3 Separate TZ72 print-head from ink system

Proceed like this:

- Switch controller power OFF and remove the data cable
- Undo the 4xM4 button-head screws at the back of the print-head (Fig. 44)

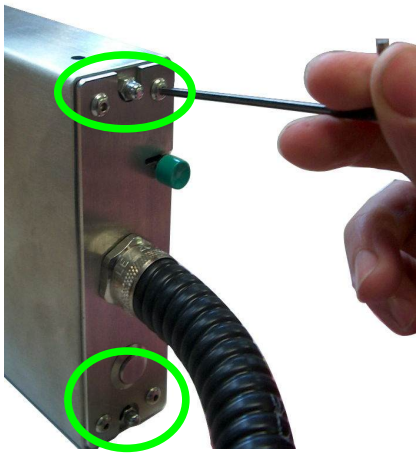

Fig. 44: screws

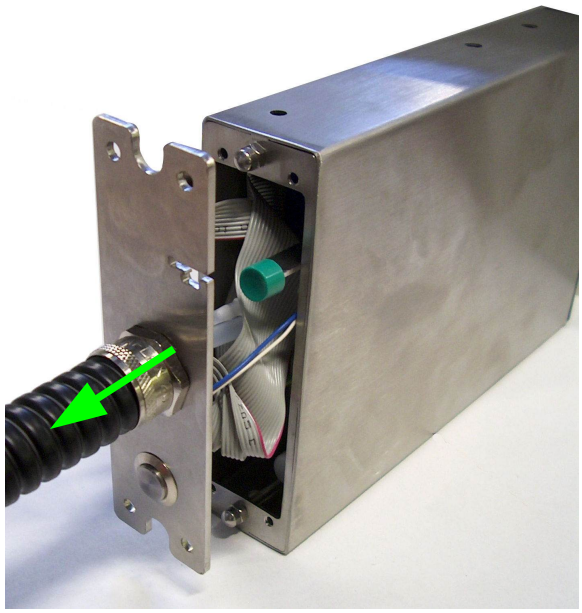

Fig. 45: Pull the back plate

- Pull the back plate (Fig. 45)

- Disconnect the prime switch wiresFig. 46)

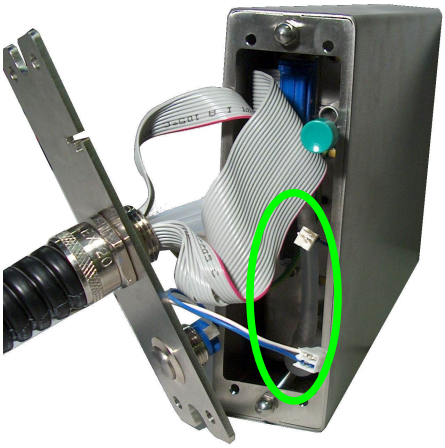

Fig. 46: Disconnect prime switch wires

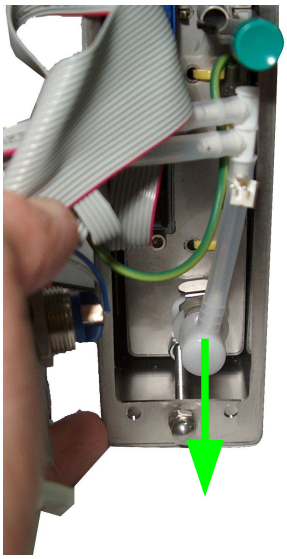

Fig. 47: Disconnect ink shut-off valve

- Disconnect the ink shut off valve (Fig. 47)
- Disconnect the earth cable (Fig. 48)

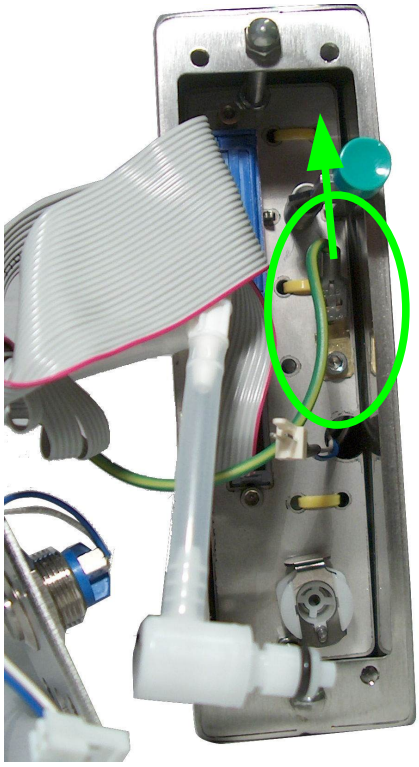

Fig. 48: Disconnect the Earth wire

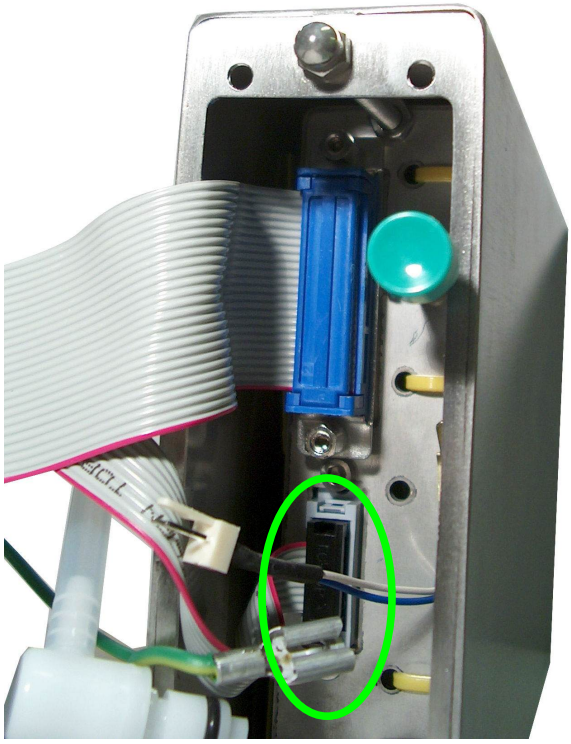

Fig. 49: Disconnect the 10 pin connector

- Disconnect the 10pin connector coming from the umbilical (Fig. 49)
- Unscrew with a 5mm key and disconnect the 25pin connector (Fig. 50)

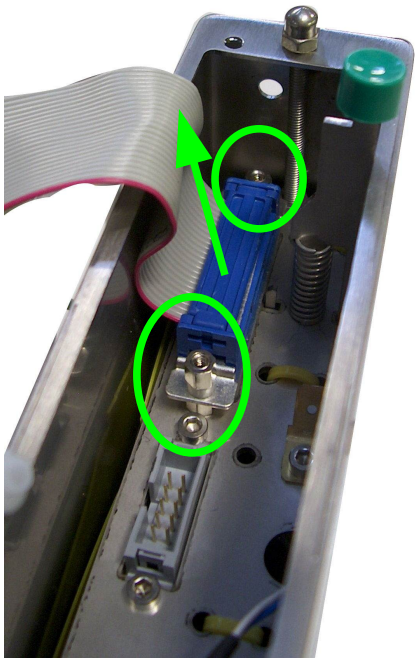

Fig. 50: Unscrew and disconnect the 25pin connector

To reassemble the print-head and the umbilical, follow the same steps in reverse order.

2.8 Flushing a TZ18/34 print-head with a syringe

By connecting a syringe at the back of the print-head, it is possible to flush only the print engines (and not the rest of the circuit).

Fig. 51: flushing the TZ18/34 print-head with a syringe

To empty the print-head for transportation, use the syringe without any fluid. The syringe will be used to expel the fluid from the print engines.

To recover a missing dot, fill the syringe with ALE SSBX solvent if the machine is for ALE BSBNPX ink , FDFLUSH if the machine is for BODNPM ink or with ALE SOB if the machine is for ALE BOB ink.

Disconnect the print-head from its bracket and put it over a collecting tray. To connect the syringe to the print-head, remove the syringe cap from the back of the print-head and screw the syringe luer (not too tightly, the thread is conical and may be very hard to unscrew!).

Flush the print-head as desired, remove the syringe and plug the syringe cap back

After flushing to recover missing dots it will be necessary to go again through the priming procedure to refill the print engines with ink.

2.9 Opening the print-head

2.9.1 Open the TZ18 print-head

- Completely empty the print-head first. Remove the ink bottle and purge the ink circuit until nothing comes out of the print-engines (see controller instruction for purging).
- Unscrew the M4 grub screw from the tube with a 2 mm Allen key (Fig. 52)

Fig. 52: unscrew the grub screw from the tube

- Unscrew the two M5 shoulder screw from the tube with a 3 mm Allen key (Fig. 53)

Fig. 53: unscrew the shoulder screws from the tube

- Unscrew the two M4 dome nuts from the back of the print-head with a 7mm key (Fig. 54)

Fig. 54: remove M4 dome nuts

- Push the valve switch inside the tube and rotate the tube with respect to the back plate to hold the switch inside (Fig. 55)

Fig. 55: push the switch inside the tube

- Move the tube backwards and remove it from the print-head (Fig. 56 and Fig. 57)

Fig. 56: remove the tube

Fig. 57: tube removed from the print-head

2.9.2 Open the TZ34 print-head

Follow this procedure:

- Completely flush the print-head first. Remove the ink bottle and purge the ink circuit until nothing comes out of the print-engines (see controller instruction for purging).
- Unscrew and remove the two M4 dome nuts from the back plate (Fig. 58).

Fig. 58: Unscrew the two M4 dome nuts

- Remove the syringe plug (Fig. 59) and the back plate (Fig. 60).

Fig. 59: remove the syringe plug

Fig. 60: remove the back plate

- Unscrew the two M5 shoulder screws (3mm Allen key, Fig. 61) and the M3 button-head screw (2mm Allen key, Fig. 62) from the tube

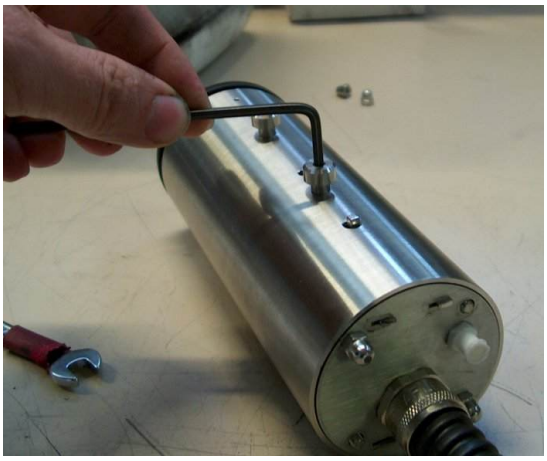

Fig. 61: unscrew the two M5 shoulder screws

Fig. 62: unscrew the M3 button-head screw

- With a tool, push the valve switch inside the tube and rotate the tube with respect to the back plate to hold the switch inside

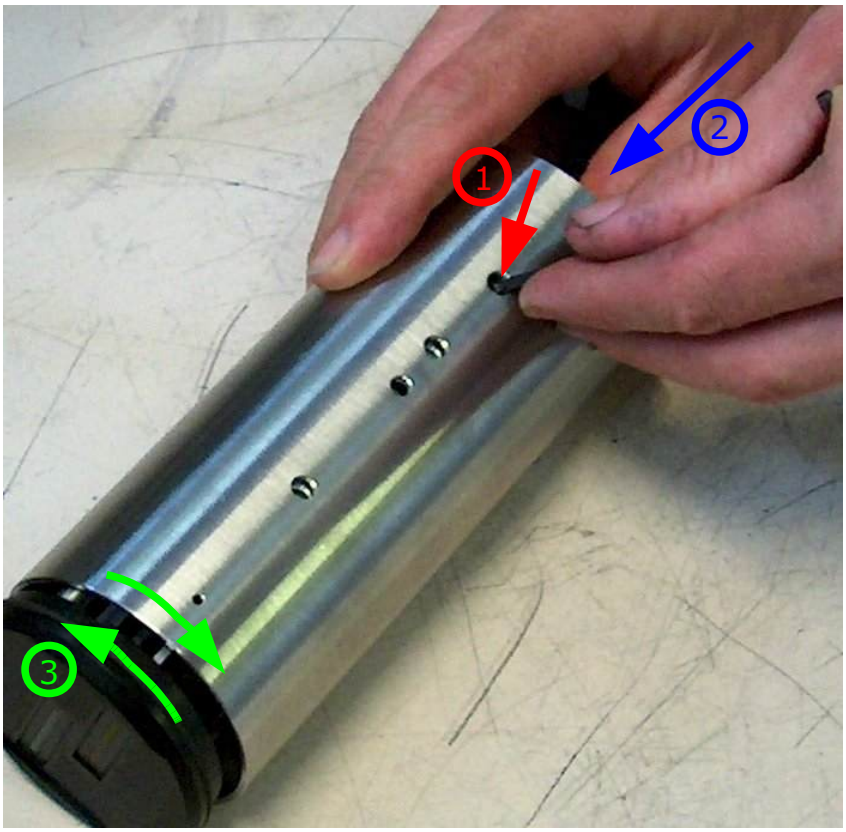

Fig. 63: push the valve switch inside the tube

- Pull the tube backwards and remove it from the print-head (Fig. 64 and Fig. 65).

Fig. 64: pull the tube backwards

Fig. 65: remove the tube from the print-head

2.9.3 Open the TZ54/TZ72 print-head

Follow this procedure:

- For a TZ 54 separate the print-head from the rest of the system by following the steps in chapter 2.7.2. Separate TZ54 print-head from ink system
- For a TZ 72 separate the print-head from the rest of the system by following the steps in chapter 2.6.2. Separate TZ72 print-head from ink system
- Remove the two M4 dome nuts at the back of the print-head (Fig. 66)

Fig. 66: remove M4 dome nuts

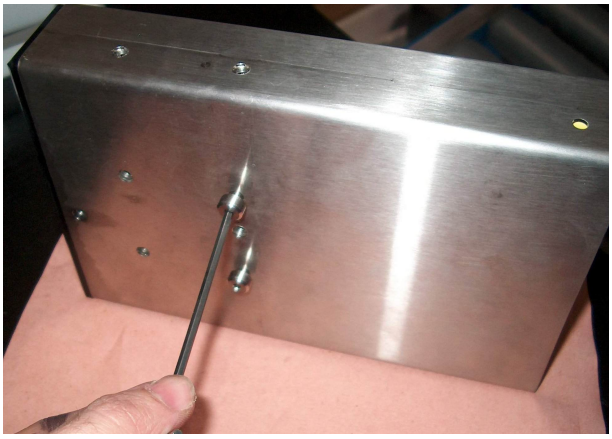

Fig. 67: unscrew the M5 shoulder screws

- Remove mounting M5 shoulder screws from the print-head body. These screws can be placed either on top or on the side of the enclosure (Fig. 67)

- Carefully extract the print-engine assembly from the enclosure

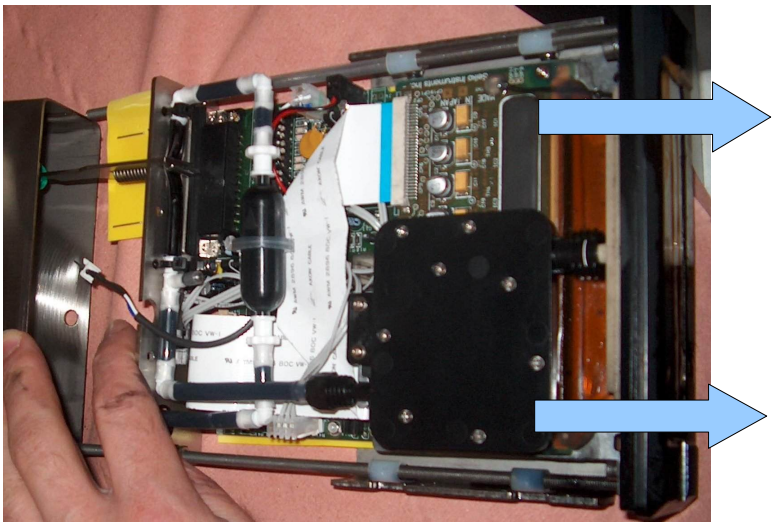

Fig. 68: Carefully extract the print engine assembly from enclosure

To reassemble the print-head, follow this procedure in reverse order.

3 Maintenance

3.1 Periodic service

You can contact ALE for a service kit containing all the necessary filters, o-rings and tubes.

3.1.1 TZ18 and TZ34 print-heads

The following actions should be taken during the periodic service:

- Open the print-head by following the instructions given in 2.7.1 Open the TZ18 print-head or 2.7.2 Open the TZ34 print-head
- Inspect tubes and fittings for leaks
- Inspect ribbon cables for possible damage
- clean interior and exterior surfaces

3.1.2 TZ54 print-head

The following actions should be taken during the periodic service:

- Open the print-head by following instructions given in 2.9.3.Open the TZ54/TZ72 print-head
- Inspect tubes and fittings for leaks
- Clean interior and exterior surfaces
- Replace the filter (ALE ref : FILTPAPER) as follows:
  - ➔ Put tissue paper under the filter
  - ➔ Disconnect it on each side (Fig. 69)

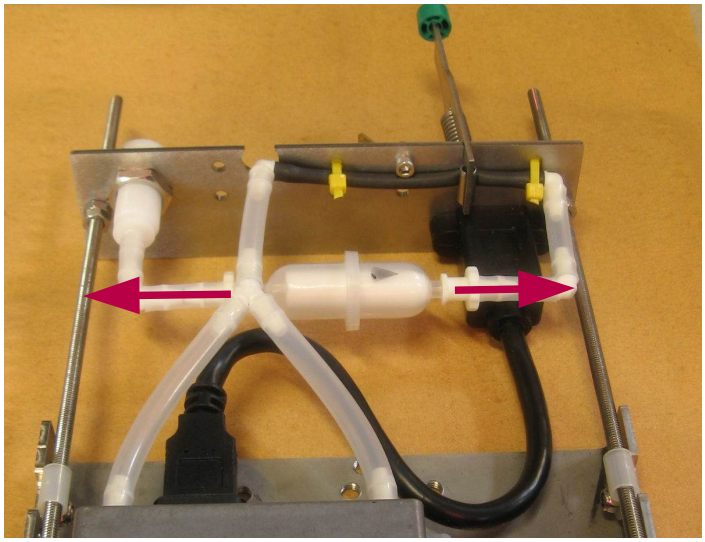

Fig. 69: Disconnect 54R ink filter

➔ Replace it with a new one. The filter has a flow direction indicated by an arrow that needs to be respected.

➔ Tightly fasten the conical fittings around the filter, as they ensure the sealing. (Fig. 70)

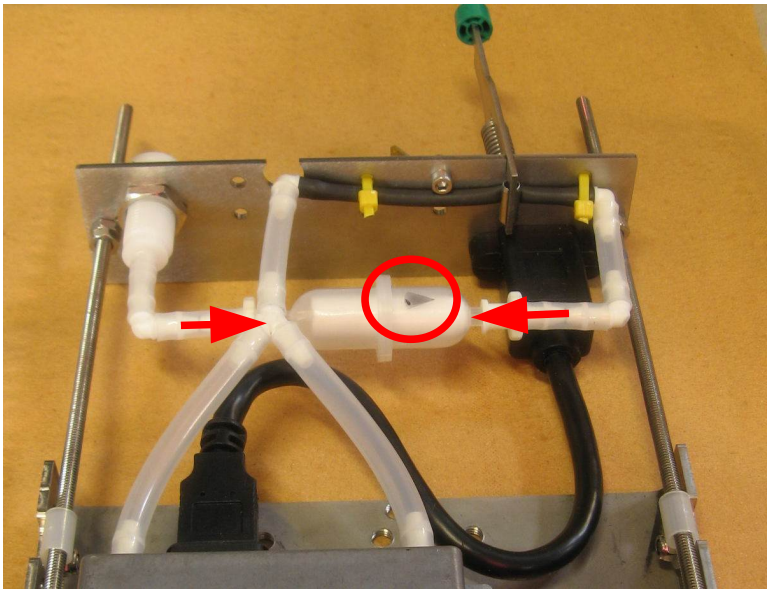

Fig. 70: mount the new filter in the good flowing direction, tightly fasten!

- Inspect the clamp valve tube for leaks or damage (cracks...). Replace if needed by a new tube of the same material (ask ALE for the reference of the tube)
- Prime the engine and print a black pad ("test" in the prime menu of the controller, see controller manual for details) to make sure all dots are printing.

3.1.3 TZ72 print-head

The following actions should be taken during the periodic service:

- Open the print-head by following instructions given in 2.7.3 Open the TZ72 print-head.
- Inspect tubes and fittings for leaks
- Inspect circuit board for cleanliness
- Clean interior and exterior surfaces
- Replace the filter (FILTPAPER) as follows:
  - ➔ Put tissue paper under the filter
  - ➔ Disconnect it on each side (Fig. 71)
  - ➔ Replace it with a new one. The filter has a flow direction indicated by an arrow that needs to be respected.
  - ➔ Tightly fasten the conical fittings around the filter, as they ensure the sealing. (Fig. 72)

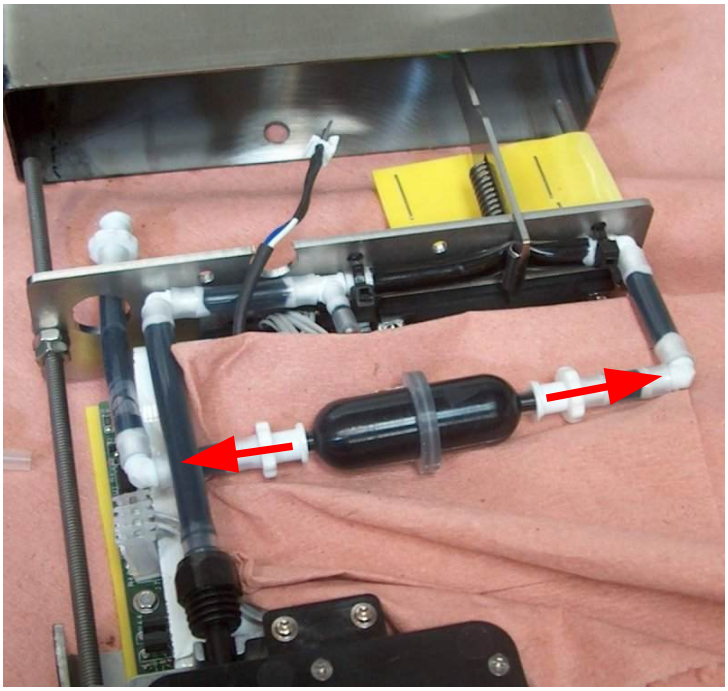

Fig. 71: protect the electronics with cleaning tissue and extract the filter

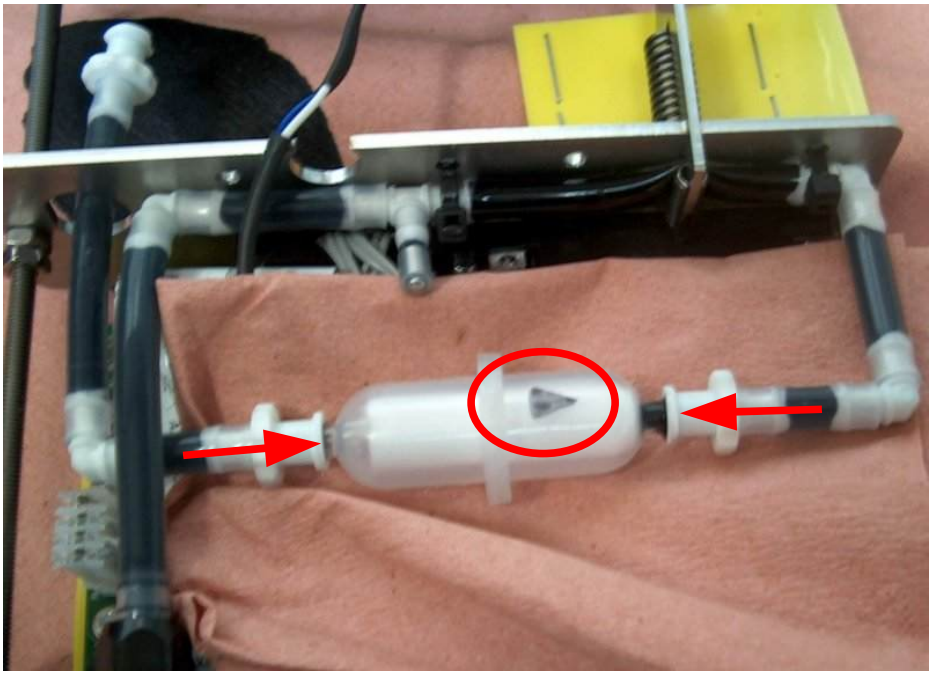

Fig. 72: mount the new filter in the good flowing direction, tightly fasten!

- Inspect the clamp valve tube for leaks or damage (cracks...). Replace if needed by a new tube of the same material (ask **ALE** for the reference of the tube)

- Prime the engine and print a black pad ("test" in the prime menu of the controller, see controller manual for details) to make sure all dots are printing.

3.1.4 Ink system

The following actions should be taken during the periodic service:

- Open the pump compartment as in 2.4 Open the ink system
- Open the reservoir (see 2.3 Access to the ink reservoir) and empty it with a syringe. Do not turn the ink system upside down!
- Inspect tubes and fittings for leaks
- Inspect circuit board for cleanliness
- Clean interior and exterior surfaces

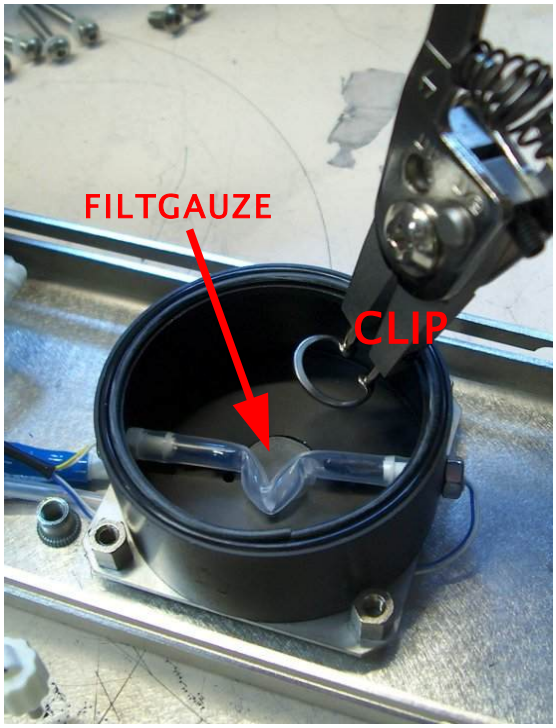

Fig. 73: Gauze filter replacement

- Replace the filter (ref FILTGAUZE) at the bottom of the reservoir: remove the clip holding the filter, replace the filter, put back the clip.
- Replace the o-rings in the reservoir if needed (please contact ALE for dimensions and materials)
- Reassemble the entire printer, prime it and check print quality.

3.2 Transport

3.2.1 Empty the ink circuit

It is recommended to clean and empty the printer before transport. To flush out the printer:

- Remove the ink bottle
- Switch the controller ON
- Put the print-head in this configuration : print-down, with a collecting bucket (Fig. 74)

Fig. 74: ink collection configuration

- Use the pump in "jet" mode (see controller user manual for details) as many times as necessary to empty the system from ink
- When ink is out, replace the air cap and the shipping cap on the reservoir
- Flush the print-head (TZ18/34) with air (see 2.8 Flushing a TZ18/34 print-head with a syringe) to expel the remaining ink

3.2.2 Pack the printer

Pack with care. Make sure the nozzle plate cannot be damaged during transport (a protection cap is delivered with each TZ18/34).

3.3 Managing effects of large temperature changes

Inks are sensitive to the temperature of the environment. The temperature range that is acceptable will depend on the type of ink used and the application.

It is important to establish that the inks in use will be appropriate for all seasons of the year.

- If the factory is very hot in summer and very cold in winter, the ink may give different print results
- Do not install the system near a window where direct sunlight can affect it

Large almost-empty ink bottles are sensitive to *significant* temperature variations in a short period of time, for example, between day and night. The air in an empty bottle will expand and contract with temperature and cause the reservoir level to move up and down.

Depending on the ink types, large *daily* expansion and contraction of air in an almost-empty bottle may affect print quality and/or dripping from the print-engine nozzle due to there being too high a level of ink in the reservoir at certain times during the day:

- In factories with large *daily* temperature fluctuations, be prepared to use smaller capacity ink bottles (for example 250mL), or, only allow bottles to become half-empty (it is the air in the bottle that expands, not the ink).
- Alternatively, remove the ink bottle when the system is not in use and fit the shipping cap. This will prevent the reservoir level changing.
- When print re-starts the excess ink will be taken from the reservoir first, quickly restoring the correct level.

The worst case scenario is a system that is (a) in a location with a large daily temperature variation, (b) using a low-viscosity ink, (c) fitted with a 650mL bottle that is almost empty, and (d) not in use [there is no opportunity for the print action to take unwanted ink from the reservoir]. This possibility should be identified and avoided.

3.4 Fault diagnosis

Refer to the TZ-series operators manual for basic fault diagnosis of common printing and priming problems likely to be encountered during installation and use of the system. Listed below is additional information.

After priming, print is OK for a few minutes. Then progressively de-primes (horizontal lines appear in the image); or print is “grey”.

- Insufficient prime pressure to clear air from the tubes in new systems or in systems that have run dry.
  - ➔ Temporarily set the prime pressure to HIGH and prime.

- Print heads are being lifted by the customer during priming so air flows back in to the engines due to incorrect level.
  - ➔ Print heads should not be moved during priming.
- Shocks to umbilicals or print heads.
  - ➔ Isolate from source of vibration.
- Pump has failed
  - ➔ Prime while checking for a good flow of ink from print engine(s)
- Tubes kinked (a "kink" occurs when a tube bends too much)
  - ➔ Prime while checking for a good flow of ink from print engine(s). With TZ34 system check for the same flow from both engines.
- Bottle valve is not opening properly or worn-out due to the same bottle being re-used.
  - ➔ Don't re-use bottles.

Bottom of print missing on an engine.

- Needs priming:
  - ➔ Prime
- Ink reservoir level too high causing an “ink bubble” on nozzles:
  - ➔ Adjust levels
  - ➔ Reservoir level too high due to empty bottle together with large daily temperature changes
  - ➔ Air leak in tubes or seals of reservoir, pump or badly fitted bottle

Top of print missing on an engine:

- Needs priming:
  - ➔ Prime

Random dots missing:

- Nozzles blocked, by a particle or by drying (solvent version)
  - ➔ Purge the print-head (use the “Jet” position). If the problem remains, on a TZ18/34, it is possible to flush the print-head with a syringe (see 2.8 Flushing a TZ18/34 print-head with a syringe). If the nozzles remain blocked, contact your distributor.

Engine not printing or exactly half of engine not printing:

- Loose connection – check ribbon cables in print-head:
  - ➔ Replace connector or use silicone paste as necessary

No print – photocell does not work:

- Installation uses a shaft-encoder and line is stationary:

➔ Line must be moving for photocell to be detected when controller set in shaft-encoder mode

- When using the I/O monitor function on controller “other functions” menu, the display “P00” changes to “P10” during photocell activation:
  ➔ Photocell is OK – problem with message ?
- I/O monitor normally shows P10 and changes to P00 when photocell is activated:
  ➔ Detection is inverted – change photocell or change the detection setting in the controller
- I/O monitor always shows P00:
  ➔ Fault in photocell, connector or controller. First try an alternative photocell to verify that controller is OK
- I/O monitor always shows P10:
  ➔ Fault in photocell, connector or controller. First try an alternative photocell to verify that controller is OK

No print, shaft-encoder does not work:

- When using the I/O monitor function on controller “other functions” menu, the display “A00” changes rapidly to “A10”, “A11”, “A01” during conveyor movement:
  ➔ Encoder working correctly – problem with message ?
- The I/O monitor shows one of the inputs not changing:
  ➔ Faulty encoder ? Connect different encoder and spin the wheel by hand to see if inputs change

Print start slipping, image misalignment:

- Poor contact between shaft-encoder wheel and conveyor:
  ➔ Rectify
- Encoder too far from print heads so that conveyor “stretch” causes problems:
  ➔ Move encoder as close to print heads as possible
- Encoder mode not switched on:
  ➔ Rectify
- Many conveyors vibrate when stationary causing false pulses to be sent by encoder. Does this occur during photocell delay?
  ➔ Minimise photocell delay
- Photocell delay quite long and system line speed variable. The longer the photocell delay, the more chance for slippage:
  ➔ Minimise photocell delay
- Photocell detection unreliable:
  ➔ Inspect photocell. Determine a method of verification
- Photocell detection inverted. (Use I/O monitor):
  ➔ Rectify

- Conveyor speed exceeding maximum print speed causing print “stretch”. Max speed is approx 40m/min at 100% print width, 20m/min at 50% and 80m/min at 200%:
  - ➔ Change width setting or encoder wheel

➔ TZ34 print-head, half of the message is inverted:

- Incorrect head configuration selected. This is common if CodeX files are used that were originally connected to other printer models:
  - ➔ Open all CodeX files, change the head configuration to 1x34mm etc., save and close

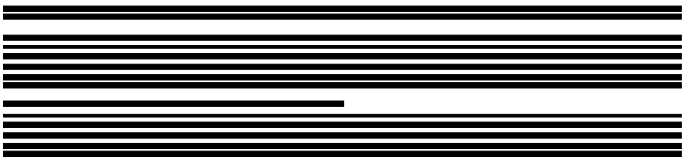

Fig. 75: Horizontal print errors due to depriming

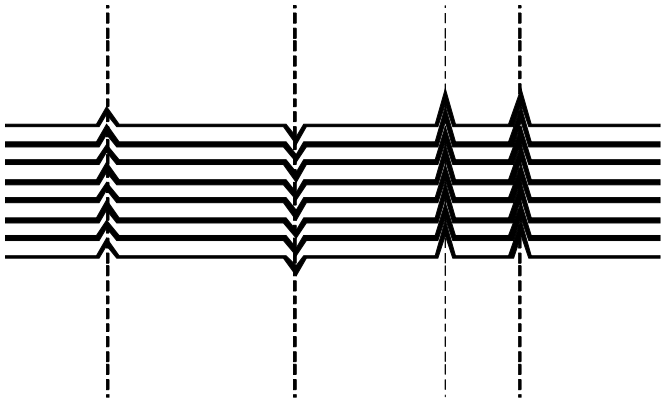

Fig. 76: Vertical print errors due to electronic problem or interference

Leak from lowest print engine:

- Bottle is almost empty together with large temperature changes:
  - ➔ Use smaller bottles or fit shipping cap
- Reservoir level too high:
  - ➔ Alter level

Pump will not prime (the sound of the pump is too high):

- Air leak in tubes or fittings:
  - ➔ If leak is not obvious, return for repair
- Kinked tube:
  - ➔ Inspect for kinks in pump tube

- Direct prime module is blocked:
  ➔ Return for repair

Pump runs continuously

- FPGA is damaged (perhaps due to incorrect use of internal photocell option):
  ➔ Replace FPGA chip
- Pump wire is shorted somewhere:
  ➔ Inspect and repair